KNOWLEDGE SHARING AND DISTRIBUTION IN AN OPEN SYSTEM: A CASE STUDY OF THE EASTERN CAPE ESTUARIES MANAGEMENT PROGRAMME

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In partial fulfillment of the requirements for the degree of Master of Information Studies (MIS) in the School of Human and Management Studies, Information Studies Programme, University of Natal, Pietermaritzburg, South Africa, March 2003.

DECLARATION

I, Lucky Nomusa Mosia, hereby declare that the content of this thesis is my own original work, unless specifically indicated to the contrary in the text.

This dissertation or thesis has not been submitted for any other degree to any other university.

Name: Lucky Nomusa Mosia.

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DEDICATION

This work is dedicated to my late aunt Nomvula Mapuleng Mosia died suddenly when I was a first year university student, my half-brother Lerato Papi Mokanyane and grandfather Amos Paulos Mosia, whom I never got a chance to pay my last respect for he was buried in Lesotho. It is also a dedication to my sister Hlengiwe Mokanyane who disappeared six years before this work was finished. We pray for her recovered every day, hoping she will come back to us safe and alive. My last dedication goes to my late friends, relatives, neighbors and colleagues-“Let God rest their souls” their spirits will always live in my heart.

ACKNOWLEDGEMENTS

I would like to acknowledge the contribution of many people and few institutions to the accomplishment of this piece of work. I am deeply grateful to my two supervisors Dr Andrew Kaniki and Mr. Patrick Ngulube under whose guidance, support and encouragement this study was conducted. In addition, I would like to thank them for giving me an opportunity and the exposure to the project management environment by involving me in the Eastern Cape Estuary Management Programme as their research assistant.

I would also like to express my sincere thanks to the following institutions: the Institute of Natural Resources and the Water Research Commission for their financial assistance, and the University of Natal Pietermaritzburg Main Library for giving me the opportunity of putting my theories into practice by employing me as a student assistant.

I give my sincere thanks to all the academic staff of the Information Studies Programme at the University of Natal for their concern, support and insightful ideas throughout my studying in the Programme. You were all very great lecturers. To all the University Main Library staff; Barbara and Carol for giving me the opportunity to prove my capability on a temporary job given. I need to acknowledge my mentor Fiz, my work environment friends Jabu, Celeste, Nola and others for their kindness and support. To all my colleagues in the Information Studies Programme and outside, especially Pearl and Nokulunga, for their encouragement even on the worst days of my life.

Finally I would like to express my sincere thanks to my family, my children Xoliswa and Simphiwe, my husband Sifiso, my uncles especially Motsamai and my aunts, especially Khumbuzile and Tsidi, my bothers, sisters, and cousins, my mother Mantsu ,my grandmother, Mapotso Seoete. To my in-laws the Xaba family, my close friends Vusi, Zodwa, Makhosazane, Hlengiwe, Mlungisi and others as well as my neighbors; for their financial and moral support and encouragement in the needing times. It sounds like the word thank you is certainly not enough but it really comes from the bottom of my heart. The absence of individual's name does not imply that their assistance has been forgotten.

ABSTRACT

Knowledge management is largely a social process. It is more about the community's understanding, skills and values in relation to their practices than technology. Knowledge is generated and shared through social interaction of people. Exploring the community's acts of communication and interaction can help to understand the knowledge they have as well as the knowledge gaps that are apparent. It can also aid in discovering ways in which their practices are shaped and constrained by the knowledge they have.

The purpose of this study was to determine the optimal means of knowledge sharing and knowledge distribution in an open system using the Eastern Cape Tyolomnqa Estuary as a case study. Different scholars stated in their different works that sharing knowledge is problematic in most organizations, whether they are formal or informal organizations. There are several reasons that have been identified as to why people do not want to share their knowledge. To achieve the objectives of this study, both secondary and primary sources of data were used. This included literature from various sources, such as books, journal articles and information from the Internet that has been reviewed and analyzed.

Interviews and focus groups were used to collect data. Interviews were conducted with 16 people who were purposively selected from the Buffalo City Council, Tyolomnqa Conservancy, Tyolomnqa Estates, Tyolomnqa Forum, and Phozi, Ncera, Sandile and Xhama communities. The key informants were people with management positions, and community leaders. The interviews were unstructured. After collecting data by means of face-to-face interviews focus groups, workshops were convened with the Tyolomnqa Forum, and Phozi, Ncera, Sandile and Xhama communities. The self-administered questionnaire was additionally used as a data collection technique for researchers. Data were analyzed through content analysis and the use of SPSS, and presented in the form of tables and figures.

It was identified that their knowledge sharing was fragmented and there was no formal organisational structure to bring communities along the Tyolomnqa Estuary to work together as one would do in bureaucratic organizations like companies. The Tyolomnqa

Estuary Forum, which has vested interests in estuary management, could be used as model to provide the organisational infrastructure to facilitate the acquisition and sharing of knowledge on the management of estuaries. It is envisaged that such forums can be a viable mechanism of facilitating the harnessing and sharing of knowledge on the sustainable use of estuaries at the local level.

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LIST OF ABBREVIATIONS AND ACRONYMS

BPRC:	Business Process Resource Centre.
ECEMP:	Eastern Cape Estuary Management Programme.
IBM	International Business Machine
ICTS:	Information and communication technologies.
IK:	Indigenous Knowledge.
INR:	Institute for Natural Resources.
KM:	Knowledge Management.
MISRG:	Management and Information System Research Group.
UNP:	University of Natal Pietermaritzburg.
UPE:	University of Port Elizabeth.
WRC:	Water Research Commission.
WWW:	World Wide Web.

Chapter One

1.1. Introduction

Today societies face much more complex human problems than in the past. Kaniki and Mpahlele[1] (2002: 2) argue that

> *In order to deal with these complex problems, to facilitate development, and manage change, "modern" communities and individuals require complex solutions by borrowing, adapting and sharing ideas and practices from different sources including traditional (indigenous) and scientific communities. It has become increasingly clear, at least to some, that data, information and particularly knowledge, if appropriately distributed, shared and utilized can enhance productivity and indeed development. The converse is also clear that, is a lack of or inappropriate use of data, related to information and knowledge can lead to poor decision-making and generally impact negatively on productivity and development.*

According to the recorded information and use of the term indigenous, most scholars state that "Knowledge is the cornerstone for development". Simply defined, term development means an upliftment and improvement of quality of people's lives. To be effective the process and achievement of the state of development requires the application of know how and skills to resolve problems and find solutions that humans encounter. Breen and McKenzie[2] (2001: 39) argued that people cannot harness experience and anticipate the future unless they manage knowledge. Further argued that experiences and knowledge are personal and until people share that experience and knowledge they cannot benefit from the stored knowledge they have, and the speed with which they develop the insight necessary to manage in a changing world is retarded.

[1] Kaniki A. Mphahlele E, (2002:2)
[2] Breen and McKenzie, (2001:39)

The need to use knowledge appropriately and effectively for human development has resulted in the development of principles and techniques for managing it. Breen and McKenzie (2001: 39) stated that technology for communication, particularly computers, has advanced much more rapidly than has our personal communication behavior. It is now possible to share experience and knowledge and to develop new insights in the collective way such that widely separated organizations and individuals can co-operate for the common good. Breen and McKenzie further argued that, this could be achieved with a culture of knowledge sharing in which due attention is directed towards building and sustaining relationships.

The present thesis is based on the management of Eastern Cape Estuaries, in particular the Tyolomnqa Estuary. The focus is on knowledge sharing and knowledge distribution for sustainable management of Eastern Cape Estuaries. The management of estuaries is a multi-disciplinary and complex matter because of its involvement of the different stakeholders from different background. It also affects various sectors of the communities, the environment, economy and politics. The effective and efficient management and utilization of estuaries require sharing the available and newly developed indigenous and scientific knowledge. Which makes indigenous knowledge even more crucial because of the reason thus it carried within ordinary people.

Indigenous knowledge and development networks promote the integration of indigenous knowledge as a contribution to the global endeavor to attain a decent and human society based on the principles of equity and sustainability. Information sharing is crucial in the indigenous knowledge network's strategy. It allows the diversity of knowledge to play its appropriate role in community based and participatory approaches for development Kaniki and Mphahlele[3] (2002: 17).

[3] Kaniki & Mphahlele op cit p17

1.1.1. Definition of key terms

To provide a clear understanding of the problem of knowledge sharing and knowledge distribution in an open system like the Eastern Cape estuaries, some key concepts are defined in the following section of the chapter.

1.1.1.1. Knowledge

Knowledge wears many faces, which makes it difficult to define. Sometimes the term is defined to suit a particular approach or problem (Allee[4],1997). According to the *Webster's dictionary*, knowledge is "the fact or condition of knowing something with familiarity gained through experience or association". The more detailed definition provided by Probst, Raub and Ramhart [5](1998: 24) is that:

> *Knowledge is the whole body of cognition and skills which individuals use to solve problems. It includes both theories and practical, everyday rules and instructions for action. Knowledge is based on data and information, but unlike these, it is always bound to persons. It is constructed by individuals, and represents their benefit about causal relationships.*

Knowledge encompasses both tacit knowledge and explicit knowledge (Pedley 1999[6]; Skyrme 1997). Tacit knowledge is developed and internalized by the knower over a long period of time and incorporates so much accrued and embedded learning that its rules may be impossible to separate from how an individual acts (Davenport and Prusak 1998[7]). Explicit knowledge on the other hand is codified and expressed as information in databases, books, documents, white papers, policy manuals and other various artifacts.

1.1.1.2. Knowledge management

The term is used to refer to the broad collection of organizational practices and approaches related to generating, capturing, and disseminating know-how and other

[4] Allee V. (1997)
[5] Propst (1998)
[6] Pedley, (1999)
[7] Davenport (1998)

content relevant to the organization, community or individual's business. Knowledge management is defined as:

The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion and use, that requires turning personal knowledge into corporate knowledge, and can be widely shared throughout an organization and/ or community (Skyrme 1997[8]).

1.1.1.3. Knowledge Sharing

Knowledge sharing is increasingly seen as the sine qua non to survival (Denning 2000). It is vital that knowledge should be shared and distributed in any environment, be it a "closed" business undertaking with formal structures or in an open system/ environment or "the wild" as expressed by Hutchins (1995) composed of different stakeholders with different organizational allegiances, so that isolated information, experiences, skills and know-how can be used to make decision for the sustainable utilization of resources.

According to Probst, Raub and Ramhardt (1998: 24), knowledge sharing can mean

> "*Either a centrally directed process of distributing knowledge among a particular group of employees or it can be the transfer of knowledge between individuals or within teams or working groups".*

In order for knowledge sharing and knowledge distribution to take place, there has to be mechanisms for knowledge production and management of existing knowledge. Knowledge sharing is not simply synonymous to standard communication process but rather the process of learning, acquiring and internalizing knowledge for application in an appropriate situation such as problem solving and decision-making. The sheer "closeness" of organizational members makes knowledge sharing easier, and because of the possibilities in the use of available information communication technologies (ICTs)

[8] Skryme (1997)

for example, the Intranet, Internet, hard copy documents, telephones, and faxes in formal organisations.

1.1.1.4. Closed systems

Closed systems or formal organizations are structured organizations like, business enterprises, universities, banks, schools, and law firms. They have specific missions and goals to which members of the organizations subscribe. There are also formal structures and rules that govern operations. Knowledge sharing in such environments is likely to be easier than in the informal systems. This is because of the specific rules, structures and mission that bring members of the organization together.

Successful knowledge sharing programmes are driven by the insiders and governed by set organizational rules, policies and structures. They are further facilitated and motivated by existing organizational goals to which members of the organization subscribe. The integration and coordination is usually easier among organizational members in close environments. Capturing what someone else in the group already knows and adding one's own knowledge is likely to be faster and more efficient in a closed environment than in an open one.

1.1.1.5. Open systems

Open systems or what Hurchins (1995) refers to as the "wild", on the other hand, bring together persons from different organizations and sectors of a community. They work in collaboration with one another for the sustainable use of available knowledge. Although accomplishments of specific goals may bring stakeholders together, the rules, regulations and structures that govern the system and its operations are not "rigid" and at times short term and at other times not formalized.

In open systems members or different stakeholders often work individually and have formal allegiances elsewhere (Denning 2000[9]). An essential ingredient of knowledge sharing programmes in large organizations is the community of practice.

[9] Denning (2009)

1.1.1.6 Community of practice

Definitions of community of practice vary somewhat, but are usually taken to mean a group of practitioners who share a common interest or passion in an area of competence and are willing to share the experiences of their practice. It differs from a work team; principally in that it has no specific time-bound work objective, but exists indefinitely for the promotion of the issue or issues around which the community is formed (Denning 2000).

According to Wenger and Snyder (1999[10]) the community of practice is defined as:

> *A group of people with shared overarching purpose or goal that is pursued by engaging in some practice. Members of that practice usually at different levels of engagement and investment within the community, and a process of enculturation become more embedded or invested in the community, and ways to increase individual's skills/abilities/knowledge/understandings in terms of the central practice.* (Wenger & Snyder 1999)

Individual identities within the community are formed and changed as individuals develop their place in the community through their participation and negotiation. This "community" has a shared history and over time has negotiated meanings, shared norms, concepts, and ways of interacting.

The knowledge community of practice such as in the Eastern Cape Estuary Management Programme (ECEMP) is usually larger, fluid and there are few legal and regulatory rules to bind stakeholders than in the closed environment.

Communities of practice are relevant to both the connecting and collecting aspects of knowledge sharing.

Connecting people who need to know with those who know requires an element of trust that is often lacking in large organizations, particularly when it comes to sharing

[10] Wenger (1999)

knowledge across organizational boundaries. Thus, asking for advice or other opinions can be seen in a low-trust environment as tantamount to an admission of ignorance. Advertising that ignorance across the entire organization is unlikely to occur if there is a risk that it may have personnel sanctions, particularly in organizations that are downsizing, or looking to save costs by laying off personnel.

Collecting knowledge so that it can be shared through various means including the web and other technology also comes to be dependent on communities. This is because it is only in communities of practice that practitioners share common objectives. Efforts to build knowledge collections in the hope that "users will come" almost always encounter a disappointing response, because builders find it difficult anticipate what knowledge users will want even if they succeed in theory, the users will regard the collection as something external and foreign unless they had a hand in designing and constructing it. The experience underlines the difference between a reference tool such as an information system and knowledge collections: the former can be effective if the information is relevant and correct, in the same way that a yellow-pages telephone directory can be useful. The latter depends for its dynamic and living quality on the active participation of those who use it, since knowledge is a much more personal affair than data or information (Wenger and Snyder 1999).

An open environment, as in the Eastern Cape Estuary Management Programme case, which is described in details in 1.2. below consists of different constituencies and stakeholders that belong to different institutions. People have allegiances to different organizations and belong to different communities, but working in collaboration to achieve the same goal, which is managing the estuaries successfully.

1.2. Eastern Cape Estuary Management Programme

The Institute of Natural Resources initiated the Eastern Cape Management Programme in the middle of 1998. The purpose of this programme is to promote the effective management and the sustainable use of the estuaries in the Eastern Cape Province. The

programme was established to promote the formulation of management policies and procedures and to establish management structures of the Eastern Cape Estuaries.

In order to consolidate and build on the success of the programme, an expanded programme was designed which has four sub-programmes namely,

(i) Local Estuary Management, with two goals:

- To develop estuary management systems; and
- To promote the implementation of estuary management system at a local level.

(ii) Estuary Management Institutional and Policy Development, with one goal:

- To contribute to the improvement of Eastern Cape estuaries management institutions and policy.

(iii) Estuary Management Capacity Building Sub programme which has three goals, namely:

- To build the capacity of estuary management forums (and stakeholder groups that are likely to form forums) to participate in the management of their estuaries;
- To build the capacity of previously disadvantaged individuals and groups in the implementation of local estuary management system and estuary management research; and
- To build the capacity of Eastern Cape based researchers to implement local estuary management systems.

(iv) Estuary Management Research Sub programme which has four goals, that is:

- To facilitate and enhance participatory management for sustainable use of Eastern Cape estuaries through direct research which is informed through practical engagement of the management of estuaries;
- To facilitate and enhance participatory management for the sustainable use of South African estuaries through direct research, which is informed through practical engagement of management of estuaries;
- To foster collaboration amongst estuary researches and managers; and
- To establish a culture of integrated estuary management research (Breen and McKenzie 2000: 39)

The purpose of the Estuary Management Research Sub-programme is to develop a deeper understanding of the issues that confront estuary managers and to develop additional estuary management processes and tools to enhance decision-making. During 2000, the programme developed a comprehensive Eastern Cape Estuary Management Research Sub Programme proposal for 2001 to 2003 that was submitted to, and accepted by the Water Research Commission (WRC) (Breen and McKenzie 2000: 39).

There are four core goals of the Eastern Cape Estuary Management Research Sub-programme developed. They are the following:

- Participatory management for sustainable use of Eastern Cape Estuaries that is facilitated and enhanced through direct research, which is formed through practical engagement of management of estuaries;
- Participatory management for the sustainable use of South African estuaries that is facilitated and enhanced through direct research which is informed through practical engagement of management of estuaries;
- Collaboration and generative learning amongst estuary researchers and managers achieved; and
- Culture of integrated estuary management and research established (Breen and McKenzie 2000: 39)

The Eastern Cape Estuary Management Programme consists of a group of researches and policy makers. These researchers are working in collaboration with one another. However, they are responsible for conducting different research on the management of the estuaries addressing different areas, namely; governance, biodiversity, sustainability, monitoring, rehabilitation, co-operative management systems and knowledge management. Short descriptions of each of these sub-projects are presented below (Breen and McKenzie 2000: 39).

1.2.1. Governance

The purpose of the governance project is to develop a legal and institutional framework for effective cooperative governance of estuaries, with potential application to other South African estuaries.

1.2.2. Biodiversity

This project reviews the current state of estuary protection and analyses alternative protection strategies to formulate a set of guidelines for a workable strategy for the protection of estuarine biodiversity in the Eastern Cape.

1.2.3. Sustainability

Sustainability project aims at developing protocols through the classification of Eastern Cape estuaries based on a predetermined set of characteristics, namely location with respect to their proximity to populated areas, mouth conditions, available living resources, user groups, exploitation methods, present management infrastructure.

1.2.4. Monitoring

This project aim at developing a protocol for Eastern Cape estuaries that will provide a realistic, yet easily determinable, measure of processes occurring within and affecting estuaries, thus formulating a basis for management response.

1.2.5. Rehabilitation

The activities of the rehabilitation project will be the linkages with other research projects in order to gather information on key blockages in terms of governance systems, the current state of estuary protection and the extent of estuary resource utilization.

1.2.6. Co-operative management systems

This project is aimed at the development of a generic co-operative management system for the use of estuaries and a decision support system to aid management.

1.2.7. Knowledge management

This project is aimed at developing a system that involves the identification, optimization and active management of the intellectual capital of the Eastern Cape Management Programme. The project also aims at identifying what knowledge the programme needs to successfully exploit and sustain itself, where the knowledge and generators of relevant knowledge reside, the optimal means for communicating and sharing the knowledge, and the design of a knowledge management system model for enhancing and sustaining the process. This research study is set within the knowledge management project of the ECEMP.

1.3. Estuaries

In the Southern African context an estuary is defined as:

A partially enclosed, coastal body of water which is either permanently or periodically open to the sea and within which, there is a measurable variation of salinity due to the mixture of sea water with fresh water derived from land drainage (Day 1980[11]).

Such water bodies are therefore linked to a river, stream or other freshwater input at one end and the sea at the other. The absence of a recognizable source of freshwater, such as that occurs in Langebaan Lagoon, would exclude any such systems from inclusion in this section although it displays many of the typical estuarine characteristics (Day 1980).

According to Reddering and Rust[12] (1990), few Southern African systems are true estuaries with only 37 (12.8%) of the 289 river mouths maintaining permanent tidal inlets with the sea. Whitfield (1992) suggested the following classification: Estuarine bays (large tidal prism, tidal mixing process, average salinity 20-35 ppt). Examples: Durban Bay (KwaZulu-Natal), Knysna (Western Cape).

Permanently open estuaries (moderate tidal prism, tidal/riverine mixing process, average salinity 10- >35 ppt). Examples Mlalazi (KwaZulu-Natal), Mzimkhulu, Mngazana,

[11] Dayb (1980)
[12] Redderring (1990)

Keiskamma (Eastern Cape), Berg (Western Cape). River mouths (small tidal prism, riverine mixing process, and average salinity < 10 ppt). Examples Mfolozi (KwaZulu-Natal), Orange. Estuarine lakes (negligible tidal prism, mixing process - wind, average salinity 1 >35 ppt). Examples: St Lucia (KwaZulu-Natal), Swartvlei (Western Cape). Temporarily closed estuaries (tidal prism absent, mixing process - wind, salinity 1 >35 ppt). Examples Mtati, Kasuka (Eastern Cape).

Estuaries are dynamic systems and virtually any physical or chemical feature associated with them is subject to rapid and sometimes extreme changes. The mouths of South African estuaries unless pinned by some rocky feature tend to meander under the influence of currents, wind and wave action and sediment movement (Whitfield 1992[13]).

Under flood conditions major mouth changes involving thousands if not millions of cubic meters of sand may occur in a few hours. Attempts to secure and stabilize mobile mouth areas, particularly in the case of larger systems are frequently doomed to failure. This was graphically demonstrated at St Lucia during the floods associated with Cyclone Domoina in 1984 when, as shown in the accompanying pictures, a tarred access road to a car park on the northern bank of the estuary mouth, which was supported by concrete retaining walls and protective dolosse, was completely destroyed (Whitfield 1992).

Estuaries are well known for their high productivity, high carrying capacity and ability to support, apart from the resident species, a variety of migratory fish, birds and invertebrates. The maximization of this capacity depends on a variety of interacting attributes or features several of which reflect the significance of processes in the catchments and the need for a holistic approach for successful estuarine management (Whitfield 1992).

A major adverse influence in South African estuaries is accelerated sedimentation because of human activities in the catchments. This results in a progressive and generally irreversible loss of aquatic habitat. The only way of counteracting this is to encourage

[13] Whitfield (1992)

agricultural practices, which reduce erosion. Any activity, which reduces or restricts tidal action in a normally tidal system, should be discouraged as this interferes with a great variety of conditions or functions ranging from oxygen availability to larval dispersal (Whitfield 1992).

Modification of freshwater inputs through abstraction affects scouring, mouth closure patterns, salinity levels and gradients and nutrient inputs. Wherever possible, this should be prevented or at least catered for through an integrated water release management plan for major dams. Artificial breaching of sandbars at arbitrary times can be disruptive to normal patterns of migration associated with seasonal rainfall. Any form of artificial mouth management should form part of a comprehensive, holistic management plan for the estuary and catchments (Whitfield 1992).

Uncontrolled exploitation of the living resources of estuaries through fishing or bait collection with its associated habitat disturbance in the context of the relatively small total area of South Africa's estuaries can have serious effects. These activities are subject to regulations set by the various national, provincial and local conservation authorities and the enforcement of these controls is very important (Whitfield 1992).

Wetlands in the context of estuaries include salt marshes; mangrove swamps, intertidal sand and mud flats as well as reed beds are all integral components of estuarine environments. Excavation, reclaiming or draining these areas contribute to a loss of estuarine function, which is often irreversible except at great expense. All these activities must be subjected to a proper environmental impact assessment before being permitted or undertaken (Whitfield 1992).

The successfully management of estuaries inspired the initiation of the Eastern Cape Estuaries Management Programme. The knowledge gathered from this programme will be useful for the effective management and the sustainable use of the Eastern Cape estuaries. The Eastern Cape Estuaries Management Programme deals with many estuaries

in the Eastern Cape. The knowledge management project concentrated on the Tyolomnqa Estuary is discussed in the following sections.

1.4. Case study: Tyolomnqa Estuary in the Eastern Cape Province

The Eastern Cape of South Africa has several estuaries. Among these estuaries are the Fish, Kowie, Mngazana, Keiskamma Kasuka and Tyolomnqa estuary. While there are many estuaries, the Tyolomnqa Estuary was chosen as a case study. The Tyolomnqa Estuary is situated approximately 45 kilometers west of the East London near the coastal resort of the Kaisers Beach, which is illustrated in Figure 1 and 2. Historically the Tyolomnqa formed the eastern boundary of the Ciskei. A potion of the East bank of the estuary is utilized as an exclusive, low-density residential development and is called Chalumna Estates.

Figure 1: Picture of the Tyolomnqa Estuary in East London: Eastern Cape *(Picture taken by Margaret McKenzie on 13 June 2000)*

Outside of this privately owned property the land is state owned and under the jurisdiction of Tribal Authorities. The Phozi community on the West Bank is the most densely populated area (Institute for Natural Resources 2000[14]: 7-8). In addition to the

[14] INR (2000)

Phozi community there are other communities located in the West Bank, like the Xhama, Ncera and Sandile.

This researcher's involvement as a research assistant on the Knowledge Management sub-programme is using the Tyolomnqa Estuary as a case study. In the wide range of estuaries to choose from as the field(s) for research, the Tyolomnqa estuary's naturalistic and underdevelopment–ness as well as the life-style of people living around inspired the researcher to use the present estuary as a field of research study. Furthermore the researcher wanted to find out about the nature of knowledge sharing and knowledge distribution in open systems where geographical distributed people work in collaboration to achieve the same goal.

Each of these sectors and the stakeholders generate their own knowledge about estuaries. Some knowledge generated is tacit (Tacit knowledge is developed and internalized by the knower over a long period of time and incorporates so much accrued and embedded learning that its rules may be impossible to separate from how an individual acts (Davenport and Prusak 1998) and the other explicit (codified and expressed as information in databases, books, documents, white papers, policy manuals and other various artifacts). There is also both scientific and indigenous knowledge. This knowledge must be shared for the efficient management of the Eastern Cape estuaries. Knowledge sharing and knowledge distribution in such environments, which are open, is very complicated and difficult. The stakeholders in the program are scattered both in terms of geographical location and work environment. Persons in these sectors belong to or work for different organizations. As a result there is little coordination and integration, as well as the collaboration of knowledge gathered, which creates a barrier to knowledge sharing and knowledge distribution.

The picture above and below shows the Tyolomnqa estuary sites.

Figure 2: Picture of the Tyolomnqa Estuary in East London (Picture taken by Margaret McKenzie on 13 June 2000)

1.5. Background to the research problem

Knowledge resides in an organization or community in an unstructured manner (Turban, McLean and Wetherbe 2002[15]: 388). Knowledge management hinges upon developing methods, tools and techniques to exploit and develop the knowledge in order to facilitate problem solving, dynamic learning and decision-making. As stated earlier knowledge management aims at identifying, selecting, organizing and repacking knowledge so that it can be shared and reused in creating more knowledge. A knowledge management system facilitates access to, and use of knowledge throughout an organization or community. It involves the care and development of knowledge, skills and communication based on a desired and shared vision of the future.

The matter of the present study arose as a result of the programme that is currently running at the Eastern Cape about the sustainability and the successful management of the Eastern Cape estuaries, as part of the ECEMP. The umbrella programme involves different sub-programmes from national, provincial and local governments as well as researchers and local communities (also called the stakeholders).

[15] Turban (2002)

Sharing and distributing knowledge is problematic to any individuals, organizations and especially to the stakeholders involved in the running the Eastern Cape Estuary Management Programme. Estuary managers and estuary users need relevant knowledge in the effective and successful management of the estuaries. The knowledge generated by the stated stakeholders is important for use for the successful management of the estuaries.

It is therefore important to have effective mechanisms or methodologies for knowledge sharing and distribution. Although there are useful and effective knowledge sharing techniques that are used in formal organizations and closed systems, it is most unlikely that these are automatically suitable for open systems like the Eastern Cape Estuary Management Programme. There is likely to be a number of factors affecting knowledge sharing and knowledge distribution in such an open system, which the study intends to investigate.

1.6. Research problem

Although knowledge management emphasizes sharing of knowledge, the sharing and using knowledge are often unnatural acts. There is a natural view that people often keep knowledge to themselves in order to preserve their power and prestige. This is even more likely in an open system such as the Eastern Cape Estuary Management Programme.
Divide and conquer may work in politics, but it would be dangerous to play politics with knowledge because information and experience can only be used to benefit the whole organization or community if they are available to those who have to make decisions. Probst, Raub and Romhardt (1998: 163).

Organizations and communities have to identify and use effective motivators and motivating techniques to facilitate knowledge sharing. At the same time “knowers” and generators of knowledge must be assured that they will be appropriately compensated, rewarded and recognized for their knowledge. Organizations and communities should also invest in the development of knowledge sharing and distribution techniques and best

practices. The Information Communication Technologies (ICTs) in knowledge networks is of course crucial in modern society.

While there are useful methodologies and indicators in various text and scholarly works for knowledge sharing in formal or closed environments, there is little guidance on knowledge sharing in an open system or open environment. One can argue that methodologies used in agricultural extension for example, can well be used in knowledge sharing. However, the basic foundation of knowledge management is that knowledge provides a competitive edge and therefore as Barclay and Murray [16](1997) have argued it is political. One cannot assume that knowledge will be shared voluntarily.

Within the Eastern Cape Estuary Management Programme there is no integrated and coordinated system and techniques for sharing knowledge that is generated among the various stakeholders. The lack of an appropriate system for integration and coordination is likely to affect the sharing and distribution of knowledge for the effective and successful management of estuaries. There is a need to identify and develop an appropriate model for sharing and distributing knowledge within and outside the knowledge community of practice of the Eastern Cape Estuary Management Programme, which includes all the stakeholders involved in the programme.

The knowledge generated and owned by these stakeholders about the estuaries is important and need to be shared. Some of this knowledge is tacit and the other explicit. The knowledge generated is also both scientific and indigenous knowledge. This knowledge must be shared for the successful management of the Eastern Cape Estuaries. Knowledge sharing and knowledge distribution therefore in environments, which are contextually known as open systems, is very complex if not difficult. This is caused by the fact that the participants or stakeholders are scattered, both in terms of geographical location and work environments. As stated before the participants in this sector belong and or work for different organizations and as a result there is little coordination and

[16] Barclay (1997)

integration, as well collaboration of knowledge gathered. This as a result creates barriers to knowledge sharing and knowledge distribution.

1.7. Research purpose

The purpose of this study therefore was to determine the optimal means for knowledge sharing and knowledge distributing in an open system using the Eastern Cape Tyolomnqa Estuary as the case study. Through this study it is hoped that a knowledge sharing and knowledge distribution model could be developed and used or adapted to other systems. The objectives listed in section 1.8 were formulated to achieve the research purpose.

1.8. Research objectives

- To identify the existing methods and techniques currently used for knowledge distribution and knowledge sharing in the Eastern Cape estuaries.
- To identify human factors that affect knowledge distribution and knowledge sharing in an open environment.
- To determine the effectiveness and appropriateness of current methods for knowledge distribution and knowledge sharing in the Eastern Cape estuaries.
- To identify and determine the relevant ICTs to be used in knowledge distributing and knowledge sharing in an open environment in the Eastern Cape estuaries.
- Develop and recommend a model for knowledge sharing in an open environment like the Eastern Cape Management Programme.

The research objectives were turned into research questions listed in the following section.

1.9. Research questions

- What currently used for knowledge sharing and distribution in the Eastern Cape estuaries?
- What human factors that affect knowledge sharing and distribution in the open environment in the Eastern Cape estuaries?
- How effective and efficient are the current methods of knowledge sharing and distribution in the Eastern Cape estuaries?

- Which ICT tools can be used in the sharing and distribution of knowledge in the Eastern Cape estuaries?
- What type of model could be developed for knowledge sharing in the open environment?

1.10. Research justification

Lack of appropriate methodologies and techniques for sharing knowledge in an open environment constituting both scientific and indigenous knowledge inspired the researcher to conduct the present study. Knowledge sharing is very important within and outside the community of the ECEMP. Knowledge sharing may be the only way in which stakeholders can have access to tacit knowledge for the appropriate and successful management of Eastern Cape Estuaries as a benefit to estuary users or local people. The conduct of this study is important for the benefit of the estuary users as well as researchers involved in ECEMP. It will also benefit the future researchers in knowledge sharing and distribution fields.

1.11. Scope and limitations

The research is limited to the Eastern Cape Estuaries in general and the Tyolomnqa Estuary in particular. The project was funded by the Water Research Commission, which defined the scope of the Knowledge Management Project of which this research forms a part. Doing commissioned research tends to limit researchers in terms of what they can achieve in the final analysis because the final product has to conform to the requirements of the sponsors. The results, which are presented in this thesis, were independently selected from the studies carried out by the researcher and the Knowledge Management Project team in the Eastern Cape Estuaries using the Tyolomnqa Estuary as a case study.

1.12. Structure of the thesis

This thesis is divided into five chapters; Chapter One is already discussed as an introduction of this thesis, the definition of key terms is discussed, the purpose of the study, the research problem and research questions, and the justification of the study. Chapter Two reviews the related literature in order to establish the context of the study's

analytical framework. Chapter Three discusses the methodology used in conducting the present study, Chapter Four presents and interprets the results of the research and Chapter Five provides conclusions and recommendations as well as suggestions for further research.

1.13. Summary of Chapter One

Chapter one looked briefly at knowledge, knowledge sharing and distribution as well as knowledge management. The chapter provided brief definitions of the key concepts and other related terms used in the study. It discusses the nature of estuary in general and specifically the Tyolomnqa and the Eastern Cape Management Programme involvement in the management of estuaries. The statement to a problem and the problem is laid. This was followed by the purpose of the study and the objectives of the study followed by the research questions drawn from the objectives as well as the justification of the study. Finally, the chapter also discussed the summary of the thesis structure.

Chapter Two: Review of the related literature

> *Companies waste billions when employees and managers don't share their knowledge. But change means understanding why they don't share.*
>
> Gomani[17] (2002)

2.1. Introduction

The present chapter presents the review of the literature related to the study. Literature review according to Kaniki (1999:17) involves:

> *The identification and analysis of literature related to one's research project. This process includes identifying potentially relevant sources, an initial assessment of these sources, through analysis of selected sources and the construction of an account integrating and explaining relevant sources.*

This chapter focused firstly on knowledge as compared to information, knowledge management, and knowledge sharing and knowledge distribution. Secondly, it discusses why knowledge sharing is important, reasons why people do not want to share knowledge, sharing indigenous knowledge, sharing knowledge in open systems as compared to closed systems and the use of ICTs for knowledge sharing and knowledge distribution.

2.1.1. Knowledge versus information.

Abell and Oxbrow (2001: 71) argued that:

> *The building of a knowledge environment is dependent on dynamic interaction. It is the interaction between the people and information that creates knowledge and, it is the ability to express and share that knowledge that creates a knowledgeable environment.*

[17] Gomani CK (2002)

The two further argued that information is exchanged between people within an organization and between them and the people who present their market that is, suppliers, customers, partners, regulators, government and many other stakeholders. Information, which is explicit knowledge in many formats flows around in and out of the organization.

The difference between knowledge and information according to Abell and Oxbrow[18] (2001) is the pyramid illustrating a progression of data, through information with knowledge at the apex. Knowledge is contextual, and being knowledgeable is about the ability to understand context, see connections and spot significance when dealing with information. Individuals and learning organization convert information into knowledge through experience and knowledge based environments are founded on the understanding of the dynamics of that process. Abell and Oxbrow (2001: 72) noted that here are four reasons or four big questions that have to be addressed in the knowledge management process. That is:

- What information there is, and where it is?
- What people do with it and why?
- If people do not use it, why they don't?
- The end results of its use.

Through knowledge management and its processes one maps where 'skill and experience' reside, how they impact on the business or a community and the effect on organizational or community change and development. Information is not itself valuable. Its value depends on the use and its effective use depends up on the ability of an individual to see meaning and significance in that information, have the ability to apply it (skill) and thus create new knowledge. Knowledge on the other hand, is equally lacking in value unless used (Abell and Oxbrow 2001: 72).

Gurteen (1999) argues that knowledge is often seen as a rich form of information. This differentiation however is not terribly helpful. A more useful definition of knowledge according to Gurteen (1999) that goes on so argued that, it is about *know-how* and *know-*

[18] Abell A.(2001)

why. He uses a metaphor of a cake. An analysis of its molecular constituents is *data* – for most purposes not very useful – you may not even be able to tell it was a cake. The list of ingredients is *information* – more useful – in that an experienced baker could probably make the cake – the data has been given context. The recipe though would be *knowledge* – written knowledge –or explicit *knowledge* – it tells one *how-to* make the cake. An inexperienced cook however, even with the recipe might not bake a good cake. A person, with relevant knowledge, experience, and skill – that is knowledge in his/her head - not easily written down - *tacit knowledge* – would almost certainly make an excellent cake from the recipe.

Gurteen (1999) further states that it is important to note that to make knowledge productive a person needs information. Knowing how to make a cake is not sufficient – what is important is the list of ingredients. And to decide what cake to make – a person needs information- the tasting of the consumers of the cake. Know-why is also important. If an ingredient of the cake was unavailable – knowing the purpose of that ingredient might help a knowledgeable baker what substitutes can be used. In fact know-why is often more important than know-how as it allows one to be creative - to fall back on principles and – to re-invent your know-how if and when necessary.

In summary knowledge is the expertise, experience and capability of staff or member of a community, integrated with process and cooperate memory while information is the raw material that knowledge work requires and it is made up of a variety of forms and types. In short knowledge is what people know and information is how they communicate it (Abell and Oxbrow 2001: 73).

2.1.2. Further analysis of knowledge as a concept

Hjertze'n and Toll (1999: 27) stated that it is divided into two types, explicit and tacit knowledge. Tacit knowledge is hidden in a person, whereas explicit knowledge has been formulated to text, databases and other media. Related, but equivalent, concepts as seen above are know-how and know-what, where the former constitutes how to do things and

the latter factual knowledge. Sveiby (1997) in Denning (2000) has split knowledge along this dimension, he separate know-how from know-what.
Sveiby (1997) stated that the know-how is closely related to tacit knowledge and know-what is related to explicit knowledge because it can easily be put on a paper and both are important for the ability to act. Competence, or the ability to act, is a wider concept than knowledge in that it includes experience, value judgments, social network, and motivation. In addition there is know-why, which as stated in the above section reflects ones understanding of principles governing a particular phenomenon.

Knowledge can be transferred through tradition (do after me, face to face) or information (through secondary medium). The latter makes the transformation of data to information to knowledge (and visa versa), which is an important process. In order to measure knowledge management and its impact it is important to know what knowledge is. The concept knowledge represents an abstract material that cannot be seen.

According to Allee (1997) some people think of knowledge as a sum of everything we have learned. Viewing knowledge as a thing impacts on how one could manage it. Allee (1997) argues that things are generally owned by somebody, so they are property. Things are kept or stored in some place out of rain. They need to be maintained and retired or recycled when they get old and worn. In this respect, knowledge would have to be managed, sometimes controlled and protected in order to be effectively and efficiently utilized. Although on the other hand it can also be used to subjugate or control others.

Allee further argues that society tallies things, for example, people and businesses own or control as a way of "keeping score" of who is winning the great game of business. Thinking of knowledge as an object leads people to focus on databases and other knowledge devices because he can be quantified and seen. They are more likely to identify legal "owners" of knowledge components. From this view as Allee (1997:46) states arise terms such as "knowledge transfer" suggesting knowledge can be passed along like a baton in a relay race. The focus is on identifying, organizing and collecting knowledge and of course measuring it.

Another way of thinking about knowledge is thinking of knowledge as a 'process'. Allee states that the process perspective brings a very different focus to the domain of knowledge management. People taking a process perspective focus more on the 'dynamic aspect of knowledge', such as sharing, creating, adapting, learning, applying and communicating. They tend to see knowledge as the dynamic soup of constantly shifting, melding and merging ingredients. They are less concerned with controlling the flow of knowledge and more interested in encouraging participation and easing communication.

Allee (1997: 46) cited Polanyi (1975) who used the construct process-of knowing to describe the process in which people are engaged which is the process of acquiring and creating new knowledge. Polanyi (1975) described knowledge "as an activity in which would be better described as a process of knowing". Allee (1997 also cited Savage [n d] who used the word knowledge to express the above stated perspective.

> *Knowledge is a continual process that flows between individuals and communities. It is like a song people sing as an expression of their being as they co-create themselves in their world with one another.* (Savage 1996).

Allee (1997:46) argues that the properties of knowledge that people choose to focus on depend on how they view its relationship into action, performance and results. Knowledge has the properties of an object in that it can be catalogued, organized and even measured to some degree. It has the properties of processes in its continual movement through creation, adaptation enhancement and application. Both these perspectives are important and must be viewed together if the impact of knowledge in making a difference is to be realized and measured.

As it has been stated above, a common element in all the discussion and a definition of knowledge is that knowledge basically takes two forms, tacit and explicit. Different authors like Nonaka and Takeuchi (1995), Sveiby, Stewart, Advinsson, and Polanyi (referred to by Earl and Scott 1998) stated this in a slightly different way, but the meaning is the same.

That is:

- The tacit knowledge is subjective, practical, and analog. It is highly personal. It is hard to formalize and, therefore, difficult to communicate to others. It is deeply rooted in action and in an individual's commitment to a specific context – a craft or profession, a particular technology or product market, or the activities of a work group or team.
- Explicit knowledge is objective and theoretical. It is formal and systematic. It can therefore be easily communicated and shared, in product specification or a scientific formula or a computer program (Nonaka and Takeuchi [19]1995).

One of the goals of knowledge management in organizations and communities is to make knowledge more visible (Allee 1997: 45). Allee argues that this corresponds to an important distinction between tacit knowledge and explicit knowledge, as described by Polanyi (cited in Earl and Scott 1998). Tacit knowledge is personal, context-specific knowledge that resides in an individual. Explicit knowledge on the other hand, is more formal codified knowledge conveyed from one person to another in a systematic ways. Tacit knowledge relies on experience, hunches and insights. Explicit knowledge is conveyed through documents, images and other deliberate communication processes and media.

Nonaka and Takeuchi (1995) stated that tacit knowledge centers on "mental models" that we carry internally. These mental modes are concepts, images, beliefs, viewpoints; value sets and guiding principles that help people define their worlds. They have further stated that tacit knowledge also includes a technical element that constitutes concrete skills and expertise, the hands on experience that comes from practice.

Some people according to Allee (1997:45) see the primary task of knowledge management as that of making tacit more explicit. Nonaka and Takeuchi (1995), also view organizational knowledge creation as an interaction between tacit and explicit. They see tacit and explicit knowledge working in both directions, in continual flux and

[19] Nonaka T (1995)

movement. This process, which they call knowledge conversion, is a social communal process.

2.1.3. Defining knowledge management

There is no universally accepted definition of the term knowledge management (KM). A common definition by Gurteen[20] (1999) is that:

> *Knowledge management is the collection of processes that govern the creation, dissemination, and leveraging of knowledge to fulfill organizational objectives. It is a business philosophy, an emerging set of principles, processes, organizational structures, and technology applications that help people share and leverage their knowledge to meet their business objectives.*

This according to Gurteen puts focus and responsibility on the individual – the knowledge worker - and on the holistic nature of knowledge management. Also critically, KM is about meeting business objectives or meeting even the unstated community goals such as development. Like Hjertze'n and Toll (1999), Gurteen (1999) also argued that knowledge management is not an end in its self but also fundamentally about sharing knowledge and putting that knowledge to use.

Abell and Oxbrow (2001: 33) took Auckland's definition, which states that:

> *Knowledge management is a discipline that promotes an integral approach to the creation, capture, organization access and use of an enterprise's intellectual capital on customer, markets, products, services and internal processes.*

These authors further define knowledge management practices as seen by Business Process Resource Centre (BPRC) as "the acquisition, sharing and use of knowledge with organizations, including learning processes and information systems". The authors, state

[20] Gurteen, D (1999)

that the merging field of KM seems to reflect a constellation of changes, some profound, some more cosmetic in the business environment (Abell and Oxbrow 2001:34).

According to the authors, the changes stated in the perception of KM philosophy, suggested that KM include:

- The increasing widespread perception of knowledge as an important asset
- The rise of occupation based on the creation and use of knowledge
- The convergence of information and communication technologies.
- Theoretical development that emphasize the importance of unique asset such as tacit knowledge (Abell and Oxbrow 2001:34).

The authors further stated BPRC which view KM as involving:

- Valuing knowledge: knowledge viewed as intellectual capital.
- Exploiting intellectual property; particularly in research-based organizations.
- Capturing project based learning: consultancies, professional firms, which are in the vanguard of developing systems to codified and communicate such knowledge.
- Managing knowledge workers: reflecting manager's desire to increase the productivity of knowledge worker, breaking down some of the barriers to knowledge sharing which are associated with professionalism.

Fenn [21](1997) cited in Denning (2000) defines KM as:

> *A discipline that promotes an integrated approach to identifying, managing and sharing all of an enterprise's information assets. These information assets may include databases, documents, policies and procedures as well as previously unarticulated expertise and experience resident in individual workers.*

According to Fenn (1997) knowledge management issues include developing, implementing and maintaining the appropriate technical and organizational infrastructures to enable knowledge sharing, and selecting specific contributing technologies and vendors.

[21] Fenn EF (2001)

Zack (1999: 45) defined the knowledge management philosophy as "managing the balance of people, processes and technology that determine the organization and its relationship with it market and beneath that there are layers of values and attitudes that determine whether the organization is a knowledge environment or not."

Zack[22] (1999) further stated that knowledge philosophy is about creating an environment where knowledge is valued and where the difference between information and knowledge and their interdependence is understood, an environment that values creativity and innovation, encourages a variety of working patterns and facilitates communication between people in different locations and from different departments.

Zack (1999) further stated that knowledge management creates an organizations or communities that encourages ideas, rewards success, allows people to fail and learn from failure, enables people to admit problems, reflect on share failure, success, problems and solutions and encourages people to ask for help. It creates an organization or a community that is aware of its environment, developing a corporate institute that allows it to react quickly and make informed decisions.

According to Zack (1999: 47) the objectives of KM programmes are mainly three; there is one that is common to all organizations, while others reflect particular industry or organizational drives.

He also stated that the objectives of KM are as follows:

- Competitive advantage
- Increase effectiveness and competitiveness
- Increased innovation and creativity
- Reduced risk and cost effective

And from other viewpoints he stated the aims of KM as to:

- Know what you know

[22] Zack MH (1999)

- Learn what you need to know and
- Use knowledge effectively (Zack 1999: 39)

The essence of knowledge management he argues is to:

- Connect people with people.
- Connect people with information.
- Enabling conversion of information into knowledge.
- Encouraging innovation and creativity through the nurturing of knowledge environment.

Knowledge management involves explicit and persistent representation of knowledge of geographically dispersed groups of people in the organization and even in communities, so as to improve the activities of the organization. Knowledge management is concern with the exploitation and development of the knowledge assets of an organization's objectives.

In an organization, know-how may relate to problem solving expertise in functional disciplines, experiences of human resources, and project experiences in terms of project management issues, design technical issues and lessons learned. This is also typical in indigenous communities and utilization of indigenous knowledge. As Kaniki and Mphahlele (2002: 17) have stated:

> *[Indigenous Knowledge] is a sum total of knowledge and skill possessed by people belonging to a particular geographical area, which enables them to benefit from the natural environment…it is shared over generations, and a new generation adds and adapts in response to the changing circumstances and environmental conditions.*

The coherent integration of dispersed know-how in a corporation or community is aimed at enhancing its access and reuse. This is called “corporate memory” or “organizational memory” or “community memory” or in effect “IK”.

Activities underlying KM in an organization or a community would comprise the detection of needs, construction, distribution, use and maintenance of the corporate memory. It demands abilities to manage disparate know-how and heterogeneous viewpoints, to make it accessible and suitable for adequate members of the organization. In a non-formal organization or community, this is the similar process that KM takes. However, the dispersion of know-how and heterogeneity of viewpoints of members of the community may be even more pronounced.

When the organization or community knowledge is distributed in several experts and documents in different locations all over the world or even a wide geographical location, the Internet or an Intranet inside the organization and World Wide Web (WWW) techniques can be a privileged means for acquisition, modeling, management of this distributed knowledge. In Senegal for example, a fishing community outside of Dakar, has effectively use web technology for communicating information within the vast community by use of touch screens and multimedia, so that even persons who cannot read, do in fact access information Thakadu[23] (1998).

Many organizations are beginning to feel that the knowledge of their employees is their most valuable asset. Traditional and local communities have over the years also understood that local knowledge about their environment is the most valuable resource. Thakadu (1998) showed that local people in Botswana have the ability for effectively and economically management of their wildlife over centuries by use of local conservation methods.

According to Davenport (1998) they may be right, but few firms and worse still communities and open systems have actually begun to actively manage their knowledge

[23] Thakadu OC, (1998)

assets on a broad scale. Davenport (1998) argued that, KM has thus far been addressed at either a philosophical or a technological level, with little pragmatic discussion on how knowledge can be managed and used more effectively on a daily basis. Davenport stated further that for the early stage of KM in business, the most appropriate form of dialogue is not detailed tactics, but rather high-level principles. When an organization decides what principles it agrees upon with respect to knowledge management, it can then create detailed approaches and plans based upon the principles.

Section 2.1.3.1 to 2.1.3.10 below; present Davenport's ten principles of knowledge management. With each principle some implications and issues are discussed.

2.1. 3.1. Knowledge management is expensive (but so is stupidity!)

Knowledge is an asset, but its effective management requires investment of other assets. There are many particular KM activities that require investment of money or labour, including the following:

- Knowledge capture, which is, creation of documents and moving documents onto some system, be it manual or computer systems;
- Adding value to knowledge through editing, packaging, and pruning;
- Developing knowledge categorization approaches and categorizing new contributions to knowledge;
- Developing information technology infrastructures and applications for the distribution of knowledge;
- Educating employees or members of given community on the creation, sharing, and use of knowledge.

Knowledge management is expensive; not managing knowledge is even more so. This is because it costs an organization or a community more to forget what key employees or members of that community know, to not be able to deal with problems and answer questions or make appropriate decisions. Just as organizations attempting to determine the value of quality determined the cost of poor quality products and services, if people wish to assess the worth of knowledge they can try to measure the cost of not knowing.

Of course, such an assessment could lead to political problems, but that is another principle.

2.1.3.2. Effective management of knowledge requires hybrid solutions of people and technology

Human beings may be expensive and cantankerous, but they are quite accomplished at certain knowledge skills. When people seek to understand knowledge, to interpret it within a broader context, to combine it with other types of information, or to synthesize various unstructured forms of knowledge, humans are the recommended tools. These are the types of knowledge tasks at which they excel, and they should be employed for these purposes.

Computers and communications systems, on the other hand, are good at different types of things. For the capture, transformation, and distribution of highly structured knowledge that changes rapidly, computers are more capable than people. They are increasingly useful though still a bit awkward for performing these same tasks on less structured textual and visual knowledge. But it is still the case that most people don't turn to computers when they want a rich picture of what is going on in a particular knowledge domain.

Given this mixture of skills, people need to construct hybrid KM environments in which they will use both humans and people in complementary ways. Just as sophisticated manufacturers have realized that “lights out or knowledge less” factories are not necessary the most effective or flexible, people have to build knowledge factories that combine someone to talk to with machines that talk in bits and bytes.

When humans are the compilers of the computerized databases of organizational and communities’ knowledge, they need to include “pointers to people” who have the know-how in their heads or tacit knowledge. The use of the database is solid and growing, and some division presidents have instructed that their divisions be well represented in the database.

2.1.3.3. Knowledge management is highly political

There is no secret that "knowledge is power", and thus no one should be surprised that KM is a highly political undertaking. If knowledge is associated with power, money, and success, it is then also associated with lobbying, intrigue, and back-room deals. If no politics appear around the KM initiative, it is a good indication that the organization perceives that nothing valuable is taking place.

2.1.3.4. Knowledge management requires knowledge managers

Knowledge cannot be managed well until groups within an organization or communities have clear responsibility for the jobs allocated to them. Among the tasks that such groups might perform are collecting and categorizing knowledge, establishing knowledge-oriented technology infrastructure, and monitoring the use of knowledge. Other professional services already have knowledge management roles in place.

A knowledge management function could inspire resentment and concern within the organization if it seeks to assemble and control all knowledge. The goal of such a unit or division within an organization should merely be to facilitate the creation, distribution, and use of knowledge by others. Furthermore, the knowledge managers themselves should not imply by their words or actions that they are more "knowledgeable" than anyone else.

2.1.3.5. Knowledge management benefits more from maps than models, more from markets than from hierarchies

It is tempting when managing knowledge to create a hierarchical model or architecture for knowledge, similar to the *Encyclopedia Brittanica*'s *Propaedia* [24]that would govern the collection and categorization of knowledge. But most organizations are better off letting the knowledge market work, and simply providing and mapping the knowledge that its consumers seem to want.

[24] *Encyclopedia Brittanica*'s *Propaedia*

This dispersion of knowledge as described in a map may be illogical, but is still more helpful to a user than a hypothetical knowledge model that is best understood by its creators, a rarely fully implemented. Mapping organizational or communities' knowledge is a single activity most likely to yield better access. Knowledge managers can learn from the experience of data managers, whose complex models of how data would be structured in the future were seldom realized.

2.1.3.6. Sharing and using knowledge are often unnatural acts

If a person's knowledge is a valuable resource, why should the stated person share it? If it's a person's job to create knowledge, why should that person put his or her job at risk by using others' knowledge instead of his or hers? People sometimes act surprisingly when knowledge is not shared or used, but they are better off as knowledge managers assuming that the natural tendency is to hoard knowledge and look suspiciously upon that from others. To enter knowledge into a system and to seek out knowledge from others is not only threatening, but also a very intricate process that requires effort. People need to be highly motivated to undertake such work.

2.1.3.7. Knowledge management means improving knowledge work processes

It is important to address and improve the generic KM process, but knowledge is generated, used, and shared intensively in a few specific knowledge work processes. The specific processes vary by organization or community, but they include research, design and development, and even more transactional processes like order configuration and pricing. If real improvements are to be made in knowledge management, improvements must be made in these key community or organizational processes.

2.1.3.8. Knowledge access is only the beginning

If knowledge access were sufficient, then there would be long lines outside the nation's libraries. Access is important, but successful KM also requires attention and engagement. It has been said that attention is the currency of the information age. In order for knowledge consumers to pay attention to knowledge, they must become more than passive recipients. More active involvement with knowledge can be achieved through

summarizing and reporting it to others, through role-playing and games based on usage of the knowledge, and through receiving the knowledge through close interaction with providers. This is particularly important when the knowledge to be received as tacit, as Nonaka and Takeuchi (1995) have long noted.

2.1.3.9. Knowledge management never ends

Knowledge managers may feel that if they could only get their organization's knowledge under control, their work would be done. However, the tasks of knowledge management are never-ending. Like human resource management or financial management, there is never a time when knowledge has been fully managed.

One reason that KM never ends is that the categories of required knowledge are always changing. New technologies, management approaches, regulatory issues, and customer concerns are always emerging. Companies or communities change their strategies, organizational structures, and product and service emphases. New managers and professionals or leaders have new needs for knowledge.

This rapid change in knowledge environments means that the considerable time should be taken in mapping or modeling a particular knowledge environment. Descriptions of knowledge environments should be “quick and dirty”, and only as extensive as usage warrants.

2.1.3.10. Knowledge management requires a knowledge contract

If knowledge is really becoming a more valued resource in organizations, people can expect to see more attention to the legalities of KM. Perhaps the greatest problem with increased KM can be the increased population of lawyers that will engender! Intellectual property law is already the fastest-growing field in the legal profession, and it will only grow faster. It is necessary to identify and acknowledge generators of knowledge.

2.2. Knowledge sharing and knowledge distribution

Denning (2000) argues that many practitioners increasingly see "knowledge sharing" as a better description than "knowledge management". Advantages of "knowledge sharing" include its commonsense comprehensibility, along with a certain degree of inter-activity implicit in any sharing. Drawbacks include the possibility that even "sharing" is insufficiently interactive, and that it implies (falsely) that the existence of knowledge precedes the sharing process, thereby (wrongly) separating KM from "innovation" and "research". Denning further argues that others would prefer to emphasize "learning", since the real challenge in implementing KM is less in the "sending" and more in the "receiving", particularly the processes of sense making, understanding, and being able to act upon the information available.

External knowledge sharing poses greater risks than internal sharing programmes, raising complex issues of confidentiality, copyright, and in the case of the private sector, the protection of proprietary assets. However it may also offer greater potential benefits. Some analysts believe that during the next five years, knowledge-sharing programmes will broaden from their current employee focus to encompass suppliers, business partners and, in particular, clients and customers (Gartner Group 1998).

Denning (2000) has again argued that the first and perhaps most difficult stages of launching a KM programme, is to put in place a strategy for sharing knowledge. It entails a collective visioning as to how sharing knowledge can enhance organizational performance, and the reaching of a consensus among the senior management of the organization on the course of action involved in sharing knowledge. Implicit in such a process is a set of decisions about the particular variety of KM that the organization intends to pursue, including: what knowledge to share? With whom to share? How the knowledge is to be shared? Why will knowledge be shared? Will knowledge be shared?

2.2.1. What knowledge to share?

Knowledge-sharing programmes may aim at making available various types of content. The programme will be very different depending on whether the intent is to share know-

how, best or good practices, or knowledge of clients or customers, of local communities, of researchers or competitive intelligence, or knowledge of processes or the indigenous and scientific knowledge. The knowledge-sharing programme will differ considerably depending on the type of knowledge being shared. Comprehensive, organization-wide programmes for sharing knowledge typically emerge when the organization's know-how is perceived as critical to its mission, where the value of the organization or communities' knowledge is high, and where the enterprise is geographically dispersed. In other cases, knowledge-sharing programmes are limited to a specific function, such as research, or a specific area of expertise (Denning 2000).

In knowledge-sharing programmes, it is common to put processes in place to ensure that the content that is shared reaches a certain minimal threshold of value and reliability. Some programmes make no explicit distinction between different levels of reliability of the material offered, once the initial threshold has been met, thus allowing users to reach their own conclusions as to its ultimate value. Other programs, particularly those that offer external knowledge sharing provide explicit guidance on whether the material has been authenticated, so those users can make inferences about its reliability. Most knowledge-sharing systems also allow in varying degrees the inclusion of new and promising ideas that have not yet been authenticated and in this sense is not yet knowledge (Denning 2000).

Denning (2000) noted that choices about what knowledge to share must go beyond generic prescriptions. Knowledge-sharing programmes have to cope with the issue of adapting know-how to the local context in which it is to be applied. Where the know-how is extremely robust and the local context largely predictable, this may not pose so much of a problem. But in most areas of complex activities or in areas of rapid development, know-how is typically less than fully robust, with continuous evolution, and the local context is often unpredictable; hence knowledge of the local context and local know-how become very important. Often in complex environments, problems will appear as wicked problems, in which the issue is not so much finding the answer to a defined problem, as it

is one of defining the problem to which one is trying to solve. Once the problem is successfully defined the answer may be obvious.

2.2.2. With whom to share knowledge?

One of the major decision concerns that organizations and communities are faced with is who are the intended beneficiaries of the knowledge-sharing system. Knowledge sharing programmes may aim at sharing with either an internal or an external audience. Internal knowledge sharing programmes typically aim at making the existing business work better, faster or cheaper, by arming the front-line staff of an organization with higher quality, more up-to-date and easily accessible tools and inputs to do their jobs, and so add value for clients or save costs. External knowledge sharing poses greater risks than internal sharing programmes — raising complex issues of confidentiality, copyright, and in the case of the private sector, the protection of proprietary assets — but it may also offer greater potential benefits (Gartner Group 1998). With reference to the Eastern Cape Estuary Management Programme, knowledge needs to be shared among all the stakeholders involved as stated in the sections above, for the successful management of the estuaries.

2.2.3. Mechanisms of knowledge sharing

There is a need to be consensus within the organization and communities like the Eastern Cape open system as to the principal channels or delivery systems. Where by which knowledge will be shared, whether face-to-face, or by way of help desks, by telephone, fax, email, collaborative tools or the Web, technical manuals, tele-centers, workshops or a combination of the above. It is important not to ignore face-to-face communications, since this is still the best and highest quality to transfer knowledge between individuals. Many organizations have also found that communities of practice cannot be successfully launched and sustained unless there is face-to-face contact.

2.2.4. Importance of knowledge sharing

Knowledge management is not something that is undertaken for its own sake, but rather something that supports the business of the organization or of course the sustainability

and maintenance of a community. Reaching explicit agreement as to why knowledge is being shared, and its likely contribution to organizational or community performance, is crucial to sustaining support over the medium term.

In case of this research estuary knowledge in the Eastern Cape is scattered and needs to be integrated, distributed and shared among the personnel involved with sustainable use in management. Pursuing all of these worthy objectives simultaneously may result in a failure to achieve any of them. It will then be useful to make an explicit choice about objectives from the outset. Moreover, agreement on objectives can help keep focus. Since KM in a large organization is inevitably a long-term process, which involves many people in different units of the organization, there is a tendency for people to forget why the organization is pursuing a KM strategy in the first place, and become distracted with peripheral activities.

Finally, since KM programmes inevitably have a cost, expenditures will need to be justified, and defended against those who would prefer to spend the resources on other activities. Having explicit KM objectives can help win the budget justification or benefit the know-how of the community.

2.2.5. Will knowledge be shared?

In large organizations or a community, discussions of strategy can go on for long periods, sometimes years, without ever coming to closure on the components. In the end, actually reaching the decision and unambiguously deciding to share and communicating that decision explicitly throughout the organization is a key step in launching a knowledge sharing strategy. An explicit decision is critical because KM typically involves a shift from a vertical hierarchical mode of operation to a horizontal boundary-crossing mode of operation. Such a shift is unlikely to occur on a sustained basis unless that there is an explicit decision at the very top of the organization that it should occur. Without such a decision, the opponents of KM will sooner or later be able to block the shift, and so thwart the organization's systematic ability to share its knowledge.

Abell and Oxbrow (2001:34) argued that the objective of networking, communities and teams is to encourage the sharing of information and knowledge and one of the most common goals of KM activities is to encourage knowledge sharing. Most organizations will admit that knowledge sharing requires a change in corporate culture, from "information is power" to "knowledge sharing builds power". New knowledge generated is essential for the functioning and survival of a community like Tyolomnqa for, community understands on the sustainable use and maintenance as well as the importance of using the estuary.

Since knowledge sharing usually entails a change in the way the community or organization operates often, it entails a shift from vertical "look up and yell down" modes of behavior to horizontal knowledge-sharing behaviors. It is important that the relevant behaviours are reflected in whatever incentive systems are in place in the organization. Thus, it is important that the value of knowledge sharing be reflected in the on-going personnel evaluation, periodic merit review or pay bonuses, incentives among community members, so that people can see that knowledge sharing is one of the principal behaviors that the community or organization encourages and rewards (Denning 2000).

It is important that knowledge sharing be designated as one of a small number of core behaviors that are rewarded in the performance review system. Convincing a large organization and communities to focus on knowledge sharing, as one of a small number of core behaviors is not easy. This may be caused by people's perceptions in the way in which they see sharing. Some may think of their knowledge as being a waste to others benefit. And some may need to be paid for sharing what they know. In the short run, there is often cynicism and posturing, but the experience of organizations or a community is that over time such a change sends an unmistakable signal throughout that particular organization or community, which does accelerate the intended behavioral change.

In practice, informal incentives, in the form of recognition by management, and visibility within the organization can often be more powerful incentives than the formal incentive system. While the establishment of formal incentives is important for the long-run

sustainability of a knowledge management programme, it is easy to over-estimate the value of incentives. The absence of formal incentives in the early days of knowledge sharing can become a pretext for not implementing the programme. The establishment of rewards for individual knowledge sharing activities can signal the importance of knowledge sharing, but also run the risk of creating expectations of rewards for behaviour that should be part of the normal way of conducting the business of the organization.

In the long-term, however, the establishment of incentives through the regular personnel and reward system of the organization can establish a clear value framework that confirms that knowledge sharing is not a mere management fad, but rather part of the permanent fabric of the organization (Denning 2000).

Many organizations and communities look at the application of rewards and incentives to encourage knowledge sharing behaviors. The most effective way of encouraging knowledge sharing appears to be through appraisal systems, where individuals are asked to assess their own knowledge-sharing behaviors and consider their colleague's view of their sharing performance as a result appraisal may affect promotion and salary, but their use is part of a culture that includes knowledge sharing as a core competence (Abell and Oxbrow 2001:59).

Team working strategies have been successfully introduced within organizations to support participative management, cross-functional work and more dynamic organizational structures. Today it is more common to find teams integrated with members that are not necessarily co-located but being supported by the use of computer networks to communicate and co-ordinate their work. However, along the life of a team, members are not always interacting by electronic-mediation; some face-to-face meetings are possible and recommended.

Thus technologies to support team working and frameworks to implement them have to be designed considering both scenarios and the transition between them. Therefore, the aim of this research is to develop an integrated model to support the building and

maintaining of distributed teams and their electronic and collaboration platforms (Management and Information System Research Group (MISRG) 2000[25]).

Allee (1997) and Abell and Oxbrow (2001:45) stated that Nonaka and Takeuchi (1995) where suggesting that as knowledge is socialized and shared, it passes through four different models of knowledge conversion in these four modes, the flow of knowledge moves from tacit to explicit to tacit once again, through the knowledge spiral of knowledge creation. Below is the model or processes suggested by Nonaka and Takeuchi in Allee, (1997: 45).

Figure 3: Modes of knowledge conversion.

Four Modes of knowledge conversion

Conversion process	Knowledge change
1. Socialization	from tacit knowledge to tacit knowledge
2. Externalization	from tacit knowledge to explicit knowledge
3. Combination	from explicit knowledge to explicit knowledge
4. Internalization	from explicit knowledge to tacit knowledge

The diagram in Figure: 3 is explained as follows:

When the tacit to tacit knowledge takes place socialization occurs. This can happen through communication between two or more people, For example face-to-face conservation.

Tacit turns to explicit knowledge as a process called externalization. This happens when a person holding tacit knowledge putts it down to any secondary form where another can retrieve it even in the absence of the person holding it, For examples, as a paper document, a computer programme, a diskette, a tape, picture and so on.

Explicit to explicit knowledge occurs when a person is using a secondary form of knowledge to make another secondary form, which is called a combination of the two, For example the use of tape recorder to transfer information to another tape recorder

[25] Management and Information System Research Group (MISRG) 2000

Explicit to tacit occurs when a person is using the available documented sources of information for their own benefit. This is called internalization, For example using a book to write an assignment or to study for an exam. The information gained from other documented sources is internalized and becomes your own knowledge, once inside a person and can also be transferred to others.

Abell and Oxbrow (2001) adding to the model further suggested that Nonaka and Takeuchi's (1995) processes have influenced many organizations as well as communities in their developments of approaches to KM. If true knowledge can exist in an individual, this means that knowledge that has been captured in some kind of explicit form; instruction or case description must be made alive in a person. This therefore is accomplished through interpretation, reflection, testing and mixing with personal experience and knowledge already in the individuals' possession. This is a process that takes time and effort (Hjertze'n and Toll 1999:39[26]).

According to Hjertze'n and Toll (1999:39) there are two ways of knowledge sharing that is mainly through tradition and through information. By tradition is meant person-to-person transfer that is watching somebody and learning through imitating. Nonaka and Takeuchi (1995) called it a tacit to tacit transfer, or socialization. Through information, knowledge can be transferred with the use of other media, such as paper, drawing, databases and other medium.

Knowledge is transferred via externalization (combination) and internalization. Both tradition and information ways of knowledge sharing have their pros and cons. Information has an advantage in that it can be mass distributed independently of time and space. The process of making knowledge explicit and to make explicit knowledge tacit is a time consuming process and much of the knowledge gets lost in the process. This can be compensated by the large potential for sharing. Tradition is the only way to transfer any type of knowledge. Hjertze'n and Toll (1999) further argued that knowledge is not an end in itself. In addition Davenport (1996:1) argued that: "…knowledge management

[26] Hjertze'n and Toll 1999:39

does not end". Knowledge management needs to ensure that knowledge that is captured and shared is also put to work.

2.3. Why knowledge sharing is important

Today, the creation and application of new knowledge is essential to the survival of almost all businesses and also essential for the functioning and survival of the community like the one in Tyolomnqa. According to Gurteen (1999) there are many reasons for that. The reasons include:

- Intangible products – which are ideas, processes, and information, are taking a growing share of global trade from the traditional, tangible goods of the manufacturing economy.
- Increasingly the only sustainable competitive advantage is continuous innovation. In other words the application of new knowledge.
- Increasing turn over of staff or participants in communities. People don't take a job for life any more. When someone leaves an organization or community their knowledge walks out of the door with them. (Denning 2000).

Large global or even small geographically dispersed organizations and communities seem to know less of everything. Expertise learnt and applied in one part of the organization or community is not leveraged in another. In many cases due to simply lack of awareness of the existence of such knowledge. Furthermore, as things change so does our knowledge base erode – in some organizations and communities as much of 50% of what a person knew five years ago is probably obsolete today. Therefore a person's indigenous or technical knowledge on any issue is important. That applies to knowledge on the management of estuaries. What another person knows is important and has to be shared for the sustainable use and the successful management of the Eastern Cape estuaries.

2.4. Why people do not want to share

Barson and others (2000) argue that many companies engage in joint products development projects with their customers and suppliers, need to transfer information to suppliers enabling them to prepare for manufacture, or keep customers informed of

progress. This also occurs to communities involved in particular projects for the development of their communities. The Eastern Cape Tyolomnqa communities and the Estuary Management Programme are one such example. Barriers to knowledge sharing can result in a failure to capture and translate requirement into meaningful specification, delays in successful results, increase in expenditures and ultimately community members' dissatisfactions. It is therefore important that a community or organizations firstly become aware of barrier to knowledge sharing and secondly, take steps to overcome them.

Gomani (2002) argues that there is a huge amount of knowledge at all levels of a community or organization: about what people need, how processes could be improved, or what new products and services could be developed. Knowledge sharing is more than the technology and processes that supports it, more than a community strategy aimed at optimizing an experience and expertise of community personnel, and even more than a cultural shift from the industrial to the information age. What this means therefore is that all the knowledge at various levels should be harnessed and shared by the community so that it has a competitive edge.

Furthermore, Gomani (2002) stated that knowledge sharing is about people. She cited Prusak, the IBM's top knowledge guru, who stated that; "Getting people to really share what they know is what is presently required if people are going to start letting the Net modernize the organization". According to Gomani (2002) in the perfect knowledge-sharing model, managers are valued not because they know more than their staff, but because they can quickly communicate to their staffs what they know and get staff members to do the same with each other. Leaders build environments of trust and mutual respect where creative contribution is nurtured, and where employees at all levels understand that being successful in the present networked world increasingly requires collaboration.

Gomani did a survey on the state of knowledge sharing in companies. She found out that many team leaders withheld information and grudgingly gave it out on a "needs to know"

basis. This is also likely to happen in open systems like the one in the Eastern Cape estuaries. People tend to be naturally protective of the knowledge they have. The tendency is to think that sharing it with others will benefit those they give out to. They are not aware of the fact that hoarding the knowledge hinders successful management and sustainable use of the estuaries. In addition, sharing what others know will result in achievement of the goals of an organization or community (Gomani 2002).

These human barriers according to her underscore the importance of tackling the people issues in knowledge management before relying on technology to improve communication. Adding to that, best practices and lessons learned have the potential to save an organization or communities' billions of Rands and more. There are many reasons why people are reluctant to share what they know. To state the few

Gomani(2000) argues that: People are busy and don't have time to share.
They forget to share.
They don't want the additional work and responsibility that goes with sharing.
They are assigned to projects they feel are unworthy of their contribution (a derisive term given by Gomani is WOMBAT which means 'waste of money, brains and time').

Based on a study that Gomani (2000) did on the middle managers about the state of knowledge sharing in their companies, she identified furthers reasons why people do not tell that they know what they know. These reasons are presented below.

2.4.1. People believe that knowledge is power

Educational systems are designed to discourage information sharing. If a person gives you an answer during a test and you will both be graded on a curve, the person who gave you an answer will be disadvantage (not to mention the risk of being labeled a cheat). Most people still struggle with the idea that "if someone tells you what he/she knows, she/ he lose something" Gomani (2002). When a company's evaluation, promotion and compensation are based on relative numbers, the perception is that sharing knowledge will (always) reduce the chance of personal success.

Local people also believe that knowledge is power, but they want knowledge to be delivered to them in the way that is understandable to them, this means changing the language to suite them if possible. This has been evident to some extent in the Eastern Cape Estuaries through the formation of the community forums, which involve the members of their community villages. These forums are used as places where people with know-how and skills can share and get what they need to know about estuaries. Therefore it is important that people share what they know and if there is a need of any initiation of an incentive and recognition to pursue knowledge sharing, it needs to be imposed.

Therefore, the first obvious solution is to change the reward or recognition system. It is necessary to find ways to reinforce and reward knowledge sharing. It is necessary to recognize and promote people who learn, teach and share, as well as to "punish" those who do not. In all best-practices companies, hoarding knowledge and failing to build on ideas of others have visible and sometimes serious career consequences (Gomani 2002).

2.4.2. People are insecure about the value of their knowledge

In Gomani's latest book, *Ghost Story: A modern business fable*, (1992) features a character that does not share knowledge because she believes she has nothing to contribute. Dot (the book's heroine) is an example of what educators refer to as "unconscious competence." Simply put, she does not know what she knows and because she is outranked and intimidated in all team discussions, she believes her input has no value.

There are mini-cultures in every organization and community. Regardless of the overall corporate culture, individual managers and team leaders can nurture a climate for collaboration within their own work group or staff. And the best of these leaders do so by taking the time and effort necessary to make people feel safe and valued. They emphasize people's strengths while encouraging the sharing of mistakes and lessons learned. They set clear expectations for outcomes and clarify individual roles. They help all members recognize what each of them brings to the team. They model openness, vulnerability and

honesty. They tell stories of group successes and personal challenges. And most of all, they encourage and respect everyone's contribution Gomani (2002).

2.4.3. People don't trust each other

According to Gomani (2002) a culture for collaboration must be based on trust. Yet, too often, in the rush to get started on a new project, a person can get groups of people together and tell them to "get to work." This approach proved less productive; as the group would not have time to discover each other's strengths and weakness nor to develop a common understanding and vision for the project. In addition, high turnover, mass layoffs and early retirements make it extremely challenging to develop the mutual trust necessary to build strong relationships throughout the organization.

Even the motivation for individuals to contribute knowledge to an electronic database is largely dependent on the relationship of the members who use the system. If individuals do not trust others with their knowledge, or don't trust that others will contribute in kind, it is unlikely that the system will be effective. Technology can facilitate knowledge sharing but it is trust that enables it.

Since people are naturally reluctant to share information with others when they don't know them well enough, the solution begins with creating opportunities for people to meet and interact in both formal and informal settings. And don't rush them. People should not be rushed but should be given time to develop relationships, to evaluate each other's trustworthiness, and to learn each other's strengths and weaknesses well enough to adapt constructively to them. Taking time to build this "societal wealth" at the beginning of a project increases the effectiveness of the team later on Gomani (2002).

Trust is fragile. Built slowly over time, it grows as people take small risks and wait for those acts of faith to be justified and reciprocated. And, unless there are reserves of trust, it can be destroyed overnight. The good news is that when trust is pervasive it becomes the force that energizes teammates, releases creative contribution and makes working together both productive and a joy Gomani (2002).

2.4.4. Fear of negative consequences of sharing knowledge

Gomani (2002) argues that “knowledge sharing has an elusive, circumstantial quality, and it is in the combination (and collision!) of ideas that creative breakthroughs most often occur”.

It becomes crucial, then, to eliminate the barriers to a free flow of ideas. Everyone has knowledge that is important to someone else, and you never know whose input is going to become an essential part of a solution. When insights and opinions are ridiculed, criticized or ignored, people feel threatened and "punished" for contributing. They typically react by withdrawing from the conversation. Conversely, when people are free to ask "dumb" questions, challenge rules and offer novel--even bizarre--suggestions, then sharing knowledge becomes a creative process of blending diverse opinion, expertise and perspectives toward a shared objective.

2.4.5. People work for other people who don't tell what they know

In any organization, the way information is handled determines whether it becomes an obstacle to or an enabler of knowledge sharing. In the Industrial Age, information management was deliberately obstructive as a matter of policy. Employees were not expected to contribute to decision-making or problem solving, so the information they were given was restricted to the bare minimum management felt they needed to do their own particular jobs.

Today, informed collaboration is seen as essential for organizational success, and leaders need to make sure that every employee has access to every fact about every aspect of the business including finances, competitive products/services and organizational strategy. This calls for an increased investment in educational and personal development programmes so that all employees have enough practical background to utilize the business data being shared (Goman 2002).

2.5. Sharing indigenous knowledge

Knowledge is limited to a certain locality that is referred to as indigenous knowledge (IK). IK is the knowledge that people in a given community have developed over time, and continue to develop. According to the Recording and using indigenous knowledge [n d] IK is:

- Based on experience.
- Often tested over centuries of use.
- Adapted to local culture and environment.
- Dynamic and changing.

IK is not confined to tribal groups or the original inhabitants of an area. It is not even confined to rural people. Rather, any community possesses indigenous knowledge - rural and urban, settled and nomadic, original inhabitants and migrants. Other names for indigenous knowledge (or closely related concepts) are “local knowledge”, “indigenous technical knowledge” and “traditional knowledge” (Recording and using indigenous knowledge [n d]).

Rural people have an intimate knowledge of many aspects of their surroundings and their daily lives. Over centuries, people have learned how to grow food and to survive in a sometimes-difficult environment. They know what varieties of crops to plant, when to sow and weed, which plants are poisonous and which can be used for medicine, how to cure diseases and how to maintain their environment in a state of equilibrium.
IK covers a wide range of subjects such as agriculture, livestock rearing, food preparation, education, institutional management, natural resource management, and health care (Recording and using indigenous knowledge [n. d.].

IK is a valuable resource for development. Under certain circumstances it can be equal to or even be superior to the know-how introduced by outsiders. Development efforts should therefore consider IK and use it to the best advantage. Although more and more development professionals have come to realize the potential of IK, it remains a neglected resource. A key reason for this is the lack of guidelines for recording and

applying IK. Without such guidelines, there is a danger that IK will become just another empty buzzword of the sort that litters the history of development efforts.

Information sharing is crucial in the IK-network's strategy, which allows the diversity of knowledge to play its appropriate role in community-based and participatory approaches for development.

2.6. Knowledge sharing in closed system

Closed systems or formal organizations are formally structured organizations like, business enterprises, universities, banks, schools, and law firms. They have specific missions and goals to which members of the organizations subscribe formal structures and rules that govern operations. Knowledge sharing in such environments is generally easy. This is because of the specific rules, structures and mission that bring members of the organization together. Successful knowledge sharing programmes are driven by the insiders and governed by set organizational rules, policies and structures. They are further facilitated and motivated by existing organizational goals to which members of the organization subscribe (Denning 2000).

In addition the sheer “closeness” of organizational members makes knowledge sharing easier, and because of the possibilities in the use of available ICTs for example, Intranet, Internet, hard copy documents, telephones, and faxes. The integration and coordination is usually easier among the organizational members in closed environments. Capturing what someone else in the group already knows and adding one’s own knowledge is often faster and more efficient in a closed environment than in an open environment.

2.7. Knowledge sharing in an open system

Open systems on the other hand bring together persons from different organizations and sectors of a community. Open systems driven by different stakeholders, which are geographically dispersed and have different formal allegiances elsewhere that work in collaboration to achieve the same purpose through the use of available knowledge. Accomplishments of specific goals may bring stakeholders together, the rules and

regulations of structures govern the system and its operations are not “rigid”; and at times short term and at other times not formalized (Denning 2000).

In open systems members or stakeholders often work individually (Denning, 2000) and or have formal allegiances elsewhere. The knowledge community of practice in an open system like in the Eastern Cape Estuary Management Program is usually larger, fluid and few legal and regulatory rules to bind stakeholders than in the closed environment.

Therefore it is important that since the stakeholders involved are geographically separated, they need to make means to share the knowledge their knowledge in order to archive their common goal, which is here the successful management of the Eastern Cape Estuaries.

2.8. ICTs on knowledge sharing and knowledge distribution

An information and communication technology is a key enabler of knowledge environment (Abell and Oxbrow 2001:51). A message from all organizations is that ICTs should be harnessed to support knowledge. It should not be the driver nor the barrier. Despite the rapid developments many fundamental knowledge management concepts and principles are not dependent on employing the latest release or the next generation of software. It is also increasingly recognized as an effective implementation of IT that can help change behavior for the knowledge sharing benefit, while poorly managed implementations can be detrimental (Abell and Oxbrow 2001:51).

The use of ICTs enables visual working that is almost akin to sitting around a table together, but online working needs careful facilitating and leadership. It requires new skills and mindset and while it allows more inclusion for some it present barriers for others. Paradoxically, collaborative, software enables people in one room to work creatively together by providing the opportunity to contribute to discussion, present and challenge ideas, vote on outcomes, anonymously, thus allowing the group to have a frank discussion without individual feeling inhibited by their lack of confidence or status. The

use of ICT for knowledge sharing, demands the team has skills available other than technical ones (Abell and Oxbrow 2001:52).

2.9. Summary of Chapter Two

This chapter has discussed the differences and connections between knowledge and information. Knowledge management is discussed. The definition and principles of knowledge management were presented. The issue of knowledge sharing and knowledge distribution in general has been discussed. The issue of why people need to share and why knowledge sharing is important has also been discussed. The issue of sharing the indigenous knowledge has also been discussed as well as the issue of sharing knowledge in open systems as opposed to closed systems. Lastly use of information communication technologies for knowledge sharing and knowledge distribution has also been discussed.

Chapter Three: Research design and methodology

"Every day that a better idea goes unused is a lost opportunity. We have to share more, and we have to share faster. I tell employees that sharing and using best practices is the single most important thing they can do". (Durr in Gomani 2002)

3.1. Introduction

The purpose of this study was to determine the optimal means of knowledge sharing and knowledge distributing in an open system using the Eastern Cape Tyolomnqa Estuary as a case study. It was hoped that a model would be developed or components of the model suggested that would be usable elsewhere in similar environments. The study sought to identify the existing methods and techniques currently used for knowledge sharing and distribution, amongst other objectives. The objectives were formulated into nine research questions as outlined in section 1.8 of Chapter One. In order to arrive at answers to these questions and attain objectives, the survey research method was used to gather data. According to Bernard (2000: 229), there are three methods that can be used for survey research data collection; they are interviews that can be conducted face-to-face or person-to-person, telephone interviews, and focus groups observation method and self-administered questionnaire. The present chapter describes the methodology followed in collecting data for the study.

Research methodology is concerned with procedures involved in identifying and collecting the data needed to address the research problem. This includes the identification of the population to be studied, sampling procedures and instrument to be used in collecting data. Bailey (1992: 25) defines methodology as "the philosophy of the research process". Haralambos and Holborn[27] (1995: 47) state that methodology is concerned with both the detailed research methods through which data are collected, and the more general philosophies upon which the collection and analysis of data are based.

[27] Haralambos (1995)

3.2. Research design

Research design is a strategic framework of action that serves as a bridge between research questions and the execution or implementation of a research (Durrheim 1999[28]: 29). According to Selltiz, Wrightman and Cook (1976: 90) research design involves:

The arrangement of condition for data collection and analysis in a manner that aims to combine relevance to the research purpose as economically as possible. A research design should provide a plan that specifies how the research is going to be executed in such a way that it answers the research questions.

Kothari (1991: 41) argues that research design, which yields maximum information and provides an opportunity for considering many different aspects of a problem, is considered the most appropriate and efficient design in respect of many research problems. According to Kothari (1991:41) research design involves considering the following factors:

- The means of obtaining information;
- The skills of researcher and their assistants;
- The objectives or the problem to be studied; and
- The availability of time and money for research work.

Powell (1991: 54) re-emphasizes the point raised by Kothari (1991: 41) where he stated that, "In the process of considering the selection of a research methodology, the researcher must keep in mind the sources of desired information, the type and nature of the data to be colleted and objectives of the study".

Yin (1994[29]) cited in Hjertze'n and Toll (1999: 17) defines research design as "the logical plan of how the study is conducted". Mouton (2001: 56) pointed out that the research design "focuses on the end product of what kind of study is being planned and what kind of result is aimed at".

[28] Durrheim K (1999)
[29] Yin RK. (1994)

From the definitions of a research design given by different authors above, the research purpose, objectives and research questions of the present study determined the type of research design.

Due to the nature of the purpose and objectives of the study the survey method was considered the most appropriate for the study. Busha and Harter[30] (1980: 62) argued that survey research is capable of collecting background information and hard to find data. On the other hand, Sproull[31] (1995:30) recommended the survey technique as being appropriate when dealing with attitudes, ideas, comments and public opinion on an existing problem or issue to be studied.

The survey method is also viewed as the best means used to gather information that describes the nature and the extent of a specific set of data ranging from physical counts and frequencies to attitudes and opinions (Moser and Kalton 1971; Marcus, Moulton and Oliver 1982; Smith 1995; Wimmer and Dominick 1994). In addition survey research is used to gain in-depth insight into the phenomenon (Bless and Higson-Smith 1995: 42).

Survey research is useful for many reasons. McCormack and Hill[32] (1997: 26) argued that survey research is a versatile method that can be applied almost in all types of research. It enables the analysis of data to be based on law of mathematics and statistics, reducing the likelihood that all considered conclusions would be drawn from research. The two researchers further argued that survey research is a cost-effective method for finding out about large populations. Its methodology can be administered in a variety of different ways, enabling geographically scatted respondents to answer the same questions.

The survey research method has also some disadvantages. These are related to ways in which error can creep into the process and undermine its usefulness. For example, respondents may be unable to answer questions either because the questions are unclear or because they do not know the answer or they may give answer they think the

[30] Busha C.H (1980)
[31] Sproull N. (1995)
[32] Mc Cormarck (1997)

researcher wants to hear (perhaps out of politeness). Without the short comings attributed to the survey method, McCormack and Hill (1997) have argued that the more careful a survey is planned, designed and executed, the less likelihood that the affect on the reliability and validity of the findings. The present study in many ways dealt with finding out the attitudes and opinions on knowledge sharing and knowledge distribution in open systems.

Therefore the survey method was found appropriate by the researcher. It enabled the researcher to collection data from all the communities involved in the Eastern Cape Estuary Management Programme. In accordance with the research design that is discussed above, a variety of research instruments for data collection were used. These are discussed below.

3.2.1. Data collection instruments.

Data collection methods can be defined as the research techniques or tools use to gather data (Bailey 1992: 26). Among the regular and conventional data collection methods in the social sciences are observation, interview and the questionnaire. According to Powell (1997:117) to observe means, "to watch attentively in a scientific or systematic manner". In an observation study, the current status of a phenomenon is determined not by asking but by observing (Powell 1997:117). The major disadvantage of observation is that it is expensive and it was not considered for data collection in the present study. The present study used structured interviews, focus groups interviews as a well as self-administered questionnaire data collection.

Interviews were conducted with people who were purposively selected from the Buffalo City Council, Tyolomnqa Conservancy, Tyolomnqa Estates, Tyolomnqa Forum, and Phozi, Ncera, Sandile and Xhama communities. The key informants were people with management positions, and community leaders. Focus groups were made up of the respondents from the Tyolomnqa communities namely, Phozi, Ncera, Sandile and Xhama. The participants for the focus groups were people that live along the estuary largely involved in leadership structures.

This was done to get people's views, opinions and suggestions on the entire knowledge of estuaries and for the possibilities of knowing the methods and the systems used in sharing and distributing knowledge for the sustainable use of estuaries. In addition the self-administered questionnaires were chosen as another data collection method. Self-administered questionnaires were distributed to researchers involved as the participants in the Eastern Cape Management Programme.

Use of documentary sources was also important for the review of related literature. Related literature helps to gain an understanding of the concepts used in a study and to understand the topic. Using more that one survey method of data collection is called triangulation.

3.2.2. Interview schedule

Interviews involve direct personal contact with research participants who are asked to answer questions related to the research problem. The interview schedules used in the present study are face to face and focus groups, which are discussed in details below.

3.2.2.1. Face to face interviews

Face to face interview is the original way of gathering survey information and still extensively used today. Here the respondents are usually interviewed by trained interviewers, who ask questions, probe for information and record responses on a standardized interview schedule (Van Vuuren and Maree[33] 1999:281).

Face to face of personal interview are good in that in-depth information can be derived from semi-structured interviews and probing. Respondents can ask for clarification if they do not understand the questions. This type of interview is usually an only option in rural areas, where a lack of telephones and illiteracy are still prevalent. The bad part about using face-to-face or personal interviews is that there are costly. The high cost associated with training and paying the interviewers and travelling expenses. There are

[33] Van Vuuren (1999)

also bad in that the interviewers may influence the responses, especially in relation to sensitive topics (Van Vuuren and Maree 1999: 282).

3.2.2.2. Focus group interviews

According to Bless and Higson-Smith (2000:110) focus groups consist of four of more respondents that are interviewed together. They believe that, focus groups can be conducted in an unstructured or semi structured way. The researcher or a facilitator of the focus group draws up a list of important questions, which are used to develop a discussion among focus group participants. Focus groups have been used for the present research to get common ideas and concepts involved in estuaries by estuary users of the Tyolomnqa Estuary.

Focus groups are advantageous in that participants are able to discuss the issues and question with each other. One person's idea may set off a whole string of related thoughts and ideas in another person. They also provide an opportunity for participants to learn from each other and perhaps to resolve important dilemmas with which they are confronted (Bless and Higson-Smith 2000: 110). This is known to be very useful in action research where part of the research goals is to help address a particular group's problems. The focus group method of data collection is said to be a comfortable method for many people, it is also used to address concern within a community.

Focus groups as mentioned earlier usually have facilitators. The facilitator has to ensure that everyone in a group has a real opportunity to contribute, and members of the group can freely expressing their ideas, without some members dominating the discussion. Therefore the facilitator needs to be an active person that answers every member participates. Passive facilitator can disadvantage the functioning of the focus group (Bless and Higson-Smith 2000: 110).

Biases due to social desirability are extremely important in focus groups. It is difficult for people to speak honestly and openly about some issues to a single interviewer. It is even more difficult to speak about those issues in a group of peers, especial when the group

members know each other. Therefore focus groups are not the best method of data collection when the research topic touches sensitive subject material. It is therefore important for the researcher to carefully consider the reasons for using a focus group technique and pay strict attention to the composition and facilitation of groups (Bless and Higson-Smith 2000: 110).

3.2 1.3. Self-administered questionnaire

A self-administered questionnaire was chosen as another data collection instrument in the present study. According to Webster's new collegiate dictionary (1976) a self-administered questionnaire is defined as "a set of questions for submission to a number of persons to get data collected". It can be used with or without a direct personal contact with respondents. Compared to other data collection methods a questionnaire allows for wide geographic contact. The questionnaire was used to collect data from the researchers involved in the Eastern Cape Estuary Management Programme, coming from different geographical areas. It was distributed during the proceedings of the workshop that took place in Port Elizabeth, in the Eastern Cape in October 2002. This was done because it provided an opportunity to get the data quickly from the core group of researchers involved in the Eastern Cape Estuary Management Programme.

Using a self-administered questionnaire is good in that it provides an opportunity for collecting large amount of data and information in a relatively short period of time .It also gives a respondent a feeling of anonymity, which encourages openness and minimizes interview bias. In addition respondents are not influences by a researcher. Self-administered questionnaire appears identical to all respondents although the interpretation among the respondents may differ (Powell[34] 1991: 90).

The choice of using the questionnaire in the present study was influenced by the type of personnel to complete it, the researchers. This was because, as Kidder, Judd and Smith (1986: 22) observed that a self-administered questionnaire is a valuable data collection instrument especially from a population that is literate and reasonable and able to deal

[34] Powell (1991)

with items contained in the questionnaire. The researcher's assumption was that the targeted group would be able understand the questionnaire and all sections will be filled with an understanding to meet the purpose and objectives of the study.

3.2.1.4. Design of the questionnaire

There are two types of questionnaire formats: structured and unstructured formats. The study used the combination of both although De Vaus (1986: 154) is of the opinion that the unstructured questionnaire allows respondents to answer freely. However; Line (1982) maintains that a combination of both structured and unstructured questions has an advantage in increasing the reliability (which is the consistency of the technique or instrument) of the responses. He emphasized that:

The use of structured questions in combination, is well established as a method of obtaining data, and is believed to increase the reliability of the responses. (Line[35] 1982: 62-63)

Structured and unstructured questionnaires have their own disadvantages and advantages. Unstructured questionnaires are likely to be less reliable, yield a low response rate, sometimes questions are misunderstood and responses given by the respondents may be final and cannot be verified. More over the unstructured questionnaires are time-consuming in data analysis. Structured questionnaires are not free from errors or disadvantage either. Structured questionnaire may not be exhaustive and, worse of all; the respondents may choose the answers, which suit them. The questions on the present study were both structured and unstructured questions.

3.3. Population of the study

The study population can be defined as a set or object that has at least one characteristic in common (Busha and Harter (1980: 57). According to Bless and Higson-Smith (2000: 85) the study "population is the entire set of objects or people, which is the focus of the researcher and about which the researcher wants to determine". The research population

[35] Line (1982)

is usually considered a critical part of any survey, especially a descriptive one. The research population of the present study was drawn from the community of the Tyolomnqa Estuary local villages, namely; Xhama, Phozi, Ncera and Sandile villages. The population also involved representative members of the Tyolomnqa Forum, Chalumna Estates, Bufallo City Council, and the Tyolomnqa Conservancy. Steering Committee members comprised of representatives from the national, provincial and local government and eleven researchers.

Scholars in research methodology such as Glazier and Powell (1992) concede that the size of the sample should be neither excessively large nor too small. An optimal sample is one, which fulfils the requirements of efficiency, representative-ness, reliability and flexible. There are two methods of sampling, namely probability sampling and non-probability sampling. Van Vuuren and Maree (1999: 276-279) states that in probability sampling every element in the target population need to have a known chance of being selected into a sample. In non-probability sampling, samples are not selected according to the principle of statistical randomness, but they are selected according to other principle, such as convenience and time.

Convenience sampling was used to select the participants in the focus groups. According to Stewart and Shamdasani[36] (1990: 51) focus groups are conducted to obtain specific types of information from clearly identified individuals. In that sense, focus groups are not random discussions amongst a group of individuals who are haphazardly brought together (Fern 2001: 170; Stewart and Shamdasani 1990: 53). Essentially, they are group discussions among carefully selected people guided by a moderator. Typically, the chosen individuals should be in position to supply the relevant information as well as be representative of the population of interest. Most focus groups are composed of six to twelve people (Stewart and Shamdasani 1990: 53).

3.4. Administration of the research instruments

The present section presents the administration of the research instruments.

[36] Stewart (1990)

3.4.1. Interview schedule

This section presents the types of interview schedules administered for data collection in the present study, which are namely face to face and focus groups interviews.

3.4.1.1. Face to face interviews

Interviews and focus groups were used to collect data. Face to face interviews were conducted with 16 people who were purposively selected from the Buffalo City Council, Tyolomnqa Conservancy, Tyolomnqa Estates, Tyolomnqa Forum, and Phozi, Ncera, Sandile and Xhama communities. The key informants were people with management positions, and community leaders. The interviews were unstructured.

The appointments for the interviews were made one week before they occurred. The participants were asked to arrange for the meeting places where the members for each category were to be interviewed individually. The maximum time allocated was 30 minutes, but in most cases the discussion went on for more than 50 minutes. The interviews ran for two days and were held on 2 and 3 July 2002. On 2 July 2002, data collection was done at the East London Museum and on the 3 July at Kaisers Beach in East London. The interview schedule in Appendix 1 was used. After collecting data by means of face-to-face interviews focus groups were convened with the Tyolomnqa Forum, and villages from Phozi, Ncera, Sandile and Xhama communities.

3.4.1.2. Focus groups interviews

Focus groups consist of a group of people interviewed together. The recommended size for focus groups ranged from 6 to 12 people (Stewart and Shamdasani 1990:53). Focus groups can be conducted in an unstructured or semi structured way (Bless and Higson-Smith (2000: 110).

The focus groups in the present study were made up of 12 respondents from the Tyolomnqa Forum, 6 respondents from Phozi village, 10 respondents from Ncera village, Sandile village had 8 and Xhama village had 12. These were the community members from each village involved in leadership structures along the Tyolomnqa Estuary.

The appointment with focus groups interviews were made a week before they took place and data collection was done over two days during the same week as the interviews. two villages were visited per day from 4 to 5 July 2002. A maximum of one hour 30 minutes was used for focus groups interviews for each village. The interview guides at Appendix 1 was used to provide direction for the group discussions. The focus group discussions recorded in order to be used during the data analysis. The researcher also used tape recorders to acquire most of the information and to ensure that all necessary information obtained.

3.4.2. Self- administered questionnaire

The self-administered questionnaire was used for data collection on researchers. The questionnaire was first pretested using a convenience sample before it was used in this study. Pre-testing the data collection instrument gave the research an opportunity to correct questions that were identified as double-barreled as well as making the instruction clearer.

Fourteen researcher were chosen from each sub-programmes involved in the Eastern Cape Estuary Management Programme. The sub-programmes include governance, rehabilitation, co-management systems, monitoring, sustainability, knowledge management and biodiversity. Two members from each sub-programme were chosen of which one of them was a sub-programme manager. The questionnaire was distributed by hand on 22 October 2002 during the workshop that was held at Port Elizabeth in the Eastern Cape from 22 to 23 October 2002. The researchers were asked to fill in the questionnaire during their spare time after the workshop, and to return the completed questionnaire back the following day when they came for the second session of the workshop on 23 October 2002. The questionnaire schedule used is in Appendix 1.

3.5. Methods of data analysis

Analysis of data is the process by which new additional meanings are sought by comparisons between various aspects of the original data. Goldhor (1972: 190) suggested

that the purpose of analysis is to throw light on the truth of the hypothesis. The processes of data analysis as Tesch (1990), quoted in Creswell (1994: 153) state is eclectic. "There is no right way of doing it. Metaphors and analogies are as appropriate as open-ended questions". The most important issue is that data analysis requires research to be comfortable with developing categories and making comparison and contrast. It requires the researcher to be open to possibilities as well and to see contrary or alternative explanations for findings.

3.5.1. Analysis of data from interviews (both face to face and focus groups)

Responses of the participants were recorded and the tape recorder was used during the running of the interviews. Tape-recorded were later transcribed into notes. This was done because meaningful data had to be extracted from the interviews for analysis. Content analysis was used for the reduction of the collected data into meaningful groupings and clusters.

According to Powell (1992: 49), content analysis is the systematic, objective and quantitative analysis of the occurrence of words, phrases, concepts and the like, so as to be able to analyze the expressed content, that is, the inferences from the communication. Powell (1992: 49) further suggested that the researcher should be able to identify the unit of analysis so as to be able to identify, define and decide on as a unit word, sentence, paragraph or theme.

Content analysis also involves the creation or identification of mutual exclusive categories. By using the content analysis, the coding and tabulation of data is made for subsequent analysis. Therefore the most important aspect of content analysis is the categorization, that is, the way in which data can be arranged into categories, which should be able to provide descriptive information relevant to the problem addressed by the study.

3.5.2. Analysis of data from the questionnaire

The data collected from the questionnaire was analyzed through the use of quantitative and qualitative methods of data analysis. SPSS[37] was used for data analysis.

The preparation of variables, which involved the coding, was done numerically and was related to the instrument. Measures of central tendencies and disposition were employed to explore the data for distribution of responses. Each question on the questionnaire was subjected to statistical analysis to provide a range of distribution of replies, the existence of concentration of central tendency in the replies and the shape of distribution or the extent to which the replies were clustered around a central point.

Gay (1981: 283) argued that, measures of central tendency give the researcher a convenient way of describing a set of data with a single number, which represent the average score attained by a group of subjects.

3.6. Evaluation of the research methodology

Data collection in the present study has its strengths and weaknesses. Face to face interviews were successful and the researcher managed to contact all of the interviewees that were selected for the study. The only problem with face-to-face interviews was the allocation of time. There was more to be said and the researcher ran out of time to collect as much information as she desired to. When it came to focus groups interviews, participants tended to be less than the invited number. The ideal size of focus groups is stated in 3.4.1.2 above, even though participation, by those attended, however, was impressive. The discussions ran smoothly and every individual member of the group was active. Therefore the method used was valid and reliable for this population. Self-administered questionnaires method proved to be valid and reliable for use with researchers, because they were all literate and involved in issues pertaining to estuaries.

[37] SPSS used to be an acronym for statistical package for social science, but nowadays it is used as it is without being taken to refer to some abbreviation.

3.7. Summary of Chapter Three.

The present Chapter discussed the methodology used in data collection. A survey method that involved face-to-face and focus group interviews, which was supplemented by the questionnaire, were used. The choice of research instrument was determined by the nature of the problem under investigation, research objectives and research questions formulated to guide the study. Data collected was analyzed using the qualitative and quantitative methods of data analysis. Content analysis was used for analysis of data from the interviews while the SPSS was used to analyze the data from the self-administered questionnaire. The research findings are presented in Chapter Four.

Chapter Four: Presentation and interpretation of results

4.1. Introduction

This chapter presents and analysis data from the survey and brings together the related questions and items. This is done to facilitate the analysis and organization of data into meaningful formats and identify relationships among variables in order to address the stated research objectives.

The content analysis method has been used in the analysis of data obtained from the interviews and focus groups. The statistical package SPSS have also been used to facilitate the analysis of data obtained from the respondents to the self-administered questionnaire. In some cases brief discussions of respondents' answers and explanations have been given to make analysis relevant to the study and to minimize the number of tables.

The main aim of the present study, as already stated in earlier chapters, were to determine the optimal means of knowledge sharing and knowledge distributing in an open system using the Tyolomnqa Estuary in the Eastern Cape as a case study. Secondly the study was hoping to come up with a knowledge sharing and distribution model. It was also hoped that such a model will be applied or adapted for use in other similar systems.

For the better understanding of the aim of the study the researcher came up with the objectives listed below:

- To identify the existing methods and techniques currently used for knowledge distribution and knowledge sharing in the Eastern Cape estuaries.
- To identify human factors that affect knowledge distribution and knowledge sharing in an open environment.
- To determine the effectiveness and appropriateness of current methods for knowledge distribution and knowledge sharing in the Eastern Cape estuaries.
- To identify and determine the relevant ICTs to be used in knowledge distributing and knowledge sharing in an open environment in the Eastern Cape estuaries.

- Develop and recommend a model for knowledge sharing in an open environment like the Eastern Cape Management Programme.

The study as laid out in the previous chapters was conducted using two different categories of respondents, namely, the local people residing and using the Tyolomnqa Estuary and the researchers in ECEMP who are involved in finding out the ways in which estuaries may be successfully managed.

Therefore the presentation and interpretation of the results will be categorized into two sections. The first section reports the results of the interviews conducted with the local people. The second section presents results of the self-administered questionnaire distributed on the researchers.

4.2 Results of interviews and focus group discussions with local community members

Interviews and focus groups were used to collect data. Interviews were conducted with 16 people who were purposively selected from the Buffalo City Council, Tyolomnqa Conservancy, Tyolomnqa Estates, Tyolomnqa Forum, and Phozi, Ncera, Sandile and Xhama communities. The key informants were people with management positions, and community leaders. The interviews were unstructured. After collecting data by means of face-to-face interviews focus groups were convened with the Tyolomnqa Forum, and Phozi, Ncera, Sandile and Xhama communities.

The Tyolomnqa Forum focus group was made up of 12 respondents, Phozi consisted of 6 respondents, Ncera had 10 respondents, Sandile had 8 and Xhama had 12. Members from each of the communities along the Tyolomnqa Estuary largely constituted the Tyolomnqa Forum focus group. The total numbers of focus group interviewees were 48 altogether. The focus groups participants were drawn from the communities that live along the estuary which belong to local community's leadership structures.

The present section intends to present the result gained from the interviews, both face to face and interview focus groups discussion. Firstly it will give the demographic background information of the respondents. Secondly the results are presented and analyzed under each objective as a sub heading.

4.2.1. Demographic background and information of the respondents

This section presents the characteristics of the respondents, which include gender, experience and location like villages from which respondents were drawn. The majority of respondents in the present study were mostly males. The selection of respondents was not predetermined by the researcher, but was caused by natural selection. More men appear to work in and or carry out activities that are based in estuaries than women in the Tyolomnqa area. For example, men use the estuary for fishing, digging for prones, and practicing certain cultural rituals, the management of the estuary and other activities. They are seen to be more experienced in activities connected with the estuaries than women do. This is because they use the estuary regularly. Most of the respondents chosen in the study were people with knowledge about the estuary and people living along the estuary and use the estuary for particular reasons.

These people have different ideas on what can be done to develop and sustain the use and the management of the estuaries. However, it was evident as will be seen later, that in spite of the ideas about the management of estuaries, they also do not have enough knowledge on how to deal with some of their concerns. This appears to be natural and in agreement with what we know about information and knowledge needs people have, because no one person or group of experts know everything about a subject and or possess all the information that is necessary for decision making and or resolving problematic situations. There were a number of suggestions that respondents came up with during the different focus groups discussions on the way in which the estuary should be developed and maintained. The table below shows those suggestions.

Table 1: Suggestions for estuary development and successful maintenance

- Estuary need to be developed and made an entertainment place that will attract the tourist or any visitors like in estuaries in KwaZulu-Natal
- Development will create employment opportunities
- Estuary must have a strict legal access, and be protected somehow, for example the installation of the gate where the security guard will be employed to control and collect payments from visitors who enter the premises to view and or utilize the estuary.
- Build guesthouses along the estuary and rent them on to visitors. The process of rental money would be used to the benefit of the local communities
- Estuary should be made a commercial place, where people will be allowed to make and sell their artwork, other artifacts and products to visitors.
- Estuary is eroding, and it needs to be maintained to keep it from being closed up by sand.
- Estuary is dirty; need to know how it can be cleaned.
- It has been suggested that councilors should be involved in matters relating to estuary management.
- Workshops need to be conducted to educate people, especially youth from schools about the importance and benefits of using and maintaining the estuary,
- The issue of individual's claiming ownership of estuary needs to be addressed.
- Job creation and employment opportunities of the estuary must be invented
- There should be a formal path or a way going between villages and the estuary
- Guards should be hired to limit the poaching problem
- Proper material for fishing or digging prone must be provided so that people do not use spades and other unauthorized material that destroys the estuary walls.

It was evident from the discussions that many people within the local communities do not have appropriate information and knowledge about managing and using estuaries, for example, how to obtain legal rights for the use of estuaries. This researcher found that people are using the estuary even though they do not have legal access. The main uses of estuaries among the local people are: fishing, swimming, healing and cleansing

themselves, digging prone, washing grazing their cattle and for other personal reasons. Healing and self-cleansing in estuaries are part of cultural beliefs of local villagers

An important question that was put to respondents addressed the matter of knowledge gaps in the management of estuaries. Similar to other user needs studies, it was felt that in order to understand what knowledge is needed and how if this knowledge is available can be shared, and respondents were guided in their focus group discussions and interviews to raise their knowledge gaps. The following table lists knowledge gaps that need to be filled.

Table 2: Knowledge gaps among local estuary users

Knowledge gaps that need to be filled
❑ Channels and procedures to follow to get legal right, for example. licenses for the use of estuaries ❑ How to deal with the problem of people claiming to own the land next to the estuary ❑ Ownership of the estuary? ❑ Need to learn about the importance of the estuary, how to maintain and preserve it for future generations. ❑ Need to know other benefit that might be brought by their involvement in an estuary management and utilization, since their historical background show that they were less interested and or involved in using the estuary except for fishing. ❑ People show interest concerning their environment but they need to be taught on how to preserve it and the impact of estuary usage.

4.2.2. Existing methods and techniques currently used for knowledge distribution and sharing in the Eastern Cape Estuaries

One of the key objectives of this study was to identify the existing methods and techniques for knowledge distribution and sharing among local communities in the

Eastern Cape. The reason for this was to enable the researcher to have an impressionistic view of the effectiveness of the methods that were available, choose from the good ones, make suggestions on improving the poor ones and suggest other methods and techniques. The local villagers indicated that their main means of sharing information and knowledge were person to person communication; community meetings, general meetings, workshops, messages passed through school children during announcement at school assemblies, writing letters, the Tyolomnqa Forum, and telephones. The study revealed that only few individuals own telephones. On the other hand, there appears to be only one public phone in each of the villages that were included in the study. More often than not the telephones are not working because they would be either full of coins or vandalized. On the other hand communities from the Buffalo City Council, the Tyolomnqa Conservancy and Chalumna Estate mainly use telephones, e-mail, faxes and the Internet for sharing and distributing knowledge amongst themselves. However, they all experience problems when it comes to communication and sharing their knowledge with communities in the villages because they have a different ethos of communicating which has largely shaped by the infrastructure at their disposal as well as other human factors described in the ensuing sections.

The Tyolomnqa Forum is also used as mean of sharing knowledge but the Forum meetings are held once in a while and some of the representatives do not enjoy a lot of support from the communities that are drawn from. The Tyolomnqa Forum is composed of people who have vested interests in the management of the Tyolomnqa Estuary. It appears to be only viable means that can be used to share and distribute knowledge in situations like we have in the Tyolomnqa Estuary where there is no organizational structure to bring together people to share knowledge.

Although the respondents indicated different kinds of methods that they use, they did not specify the kind of knowledge and or information that is suited for the specific methods/techniques. However, based on our knowledge from the existing literature of information use and or adoption process for example, it is possible to predict and or speculate what kind of delivery system or technique is appropriate for specific

information and knowledge need levels. For example, we know that in cases where people simply need to be made aware of something, mass communication or mass meetings are sufficient to convey the necessary awareness messages. However, in instances where people have to learn particular skills and or assimilate specific know-how, one-on-one and or personal interaction is most appropriate.

4.2.3. Effectiveness and appropriateness of current methods for knowledge sharing and distribution in the Eastern Cape Estuaries

For various reasons supported in the literature review in Chapter Two, knowledge sharing is important, whether it is done traditional or through formal. Traditional ways are confined to face-to-face or person-to-person communication whereas the formal ones are defined by the use of ICTs and other resources (Hjertze′n and Toll 1999:39). According to the results of the study, people from the Buffalo City Council, Chalumna Estate and Tyolomnqa Conservancy have access to computers, telephone and faxes, not only in their working places but in their homes as well.

Having the stated resources can make communicating much easier. With access to formal communication resources sharing and distribution of knowledge might be less problematic. The responses also proved that in addition to the stated communication resources, the stated groups also use traditional way of communication resources to distribute and share know-how, which are namely, person-to-person, meetings, workshops, meetings, pamphlets and other traditional methods. With both the traditional and formal ways communication it is possible to distribute and share knowledge. The current methods used by the communities mentioned in this paragraph seem to be appropriate and effective.

On the other hand people from Ncera, Sandile, Phozi and Xhama rely mostly on the traditional ways of communication, to distribute and share their know-how and skills. As stated in the previous section, these communities have limited access to formal communication sources. They mostly depend on traditional ways. Even if they had some of the formal ways like computers and the Internet, they would need the training or

intermediaries to use them effectively. While face-to-face delivery of information and knowledge are appropriate and effective in some situations and for delivering specific types of knowledge, it is certainly not appropriate in all cases. Some of the problems with face-to-face techniques include the slowness at which knowledge is delivered. It also means that at times only a few people can be communicated to at a given time. Therefore, even though village members distribute and share knowledge in their own ways, the methods available are not always and in all cases as effective and appropriate as the one used by communities in the Buffalo City Council, Chalumna Estate and Tyolomnqa Conservancy.

Furthermore, the use of schools as an avenue of communication by the villagers to distribute and share their know-how and skills is sometimes problematic, especially during the holidays when schools are closed. The temporary closure of the schools also affects the smooth operation of the postal system that depends on the co-operation and goodwill of the teachers. During school holidays there would be no teachers or school children to take messages to various communities.

Only the stated traditional options like face-to-face, community general meetings and letter writing seemed to be the possible ways for distributing and sharing urgent knowledge. The situation among villagers in the Tyolomnqa area is no different from that of other villagers in rural South Africa in particular and Africa in general. However, it is important to address their problems based on the potential usage of technology that is increasingly becoming available. For example, satellite and solar technologies are becoming easily available and user friendly. In rural Zimbabwe for example, solar energy has been effectively used to facilitate television broadcasting and even Internet connectivity.

In South Africa itself, steel sided kiosks equipped with computers have been introduced to some villagers in Cwili near Kei Mouth (Philp 2003:10). Although the project was designed by the Council of Scientific and Industrial Research with the support of the Department of Science and Technology to find out whether rural South African children

had the cognitive skills to understand computers without any formal training, it shows that the technology model of sharing and distributing knowledge among the rural communities in South Africa is possible.

Although persons from the Buffalo City Council, Chalumna Estate, and Tyolomnqa Conservancy have access on the various delivery systems, it is also important to point out that the effectiveness of these techniques depends on how skilled the users are. For example, while the Internet may be available to these groups of people, its effective use depends on how computer and information literate the users are. Otherwise due to the proliferation of information on the Internet and particularly the World Wide Web one can simply get "lost" when looking for specific information.

4.2.4. Human factors that affect knowledge sharing and distribution in an open environment

There are barriers to knowledge sharing that can result in a failure to capture and translate requirements into meaningful specifications, delays in successful results, increase in expenditures and ultimately community members' dissatisfactions Gomani (2002). One of the objectives presented in the study is human factors that affect knowledge distribution and sharing in open systems. Scholars like Gomani (2002) argued that there is a huge amount of knowledge at all levels of community individuals or organization.

The findings confirmed that stakeholders attain and own knowledge on how they think the estuary need to be improved and managed. Gomani (2002) stated that knowledge sharing is about people. On the other hand, Turban, McLean and Wetherbe (2002:396) argued that knowledge is transferred through social interaction rather than being extracted from knowledge carriers. Communication outfits and partnerships facilitate access to knowledge, but getting people to really share what they know is difficult.

The findings revealed that even though stakeholders attain and own knowledge there are limitations in distributing and sharing it. As demonstrated in the previous chapters, the population along the Tyolomnqa Estuary is spatially distributed making it rather

problematic for stakeholders to distribute and share knowledge. It has also been stated above that traditional ways of communication mostly requires physical contact of stakeholders. Therefore, geographical dispersed individuals using the traditional ways limit the chances of distributing and sharing knowledge among estuary users.

Chapter Two also stated that it is important that knowledge sharing be designated as one of a small number of core behaviors that are rewarded in the performance review system. Getting the agreement among communities in an open system as the means of knowledge sharing is not easy. This is because they do not have allegiance to the system as one would get in the corporate world. This may be caused by people's perceptions in the way in which they consider sharing. Some may think of their knowledge as being a waste to others or benefit. And some may need to be paid for sharing what they know. Some people may fail to share for fear of exposing their ignorance or antagonizing others.

The findings supported the view that ownership is a human factor that affect sharing and distribution of knowledge. Responses provided that people on the east bank (Tyolomnqa villages) thought that the people on the west bank (Chalumna estate) own the estuary. People on the east bank think they need the West Bank's cooperation to use the estuary. It has been identified that east bankers' pay certain amount to certain individuals of the west bank in order to use the estuary. Therefore people with knowledge about the way in which the estuary operate are keeping the knowledge to themselves for their selfish reasons and their illegal benefit.

Gomani (2002) emphasized that a culture for collaboration must be based on trust. Yet, too often, in the rush to get started on a new project, a person can get groups of people together and tell them to "get to work." This approach proves less than productive, as the group wouldn't have time to discover each other's strengths and weakness nor to develop a common understanding and vision for the project.

The issues pertaining to trust in the sharing of knowledge identified by Gomani (2002) was also evident in the Eastern Cape Tyolomnqa Estuary. These are people who

traditionally did not work closely together in order to develop their communities as a result of the apartheid ethos. It seems developing trust between the communities is key to the sustainable use of estuaries and sharing of knowledge.

Openness is another human factor that is intrinsically connected to trust. To some extent the lack of openness is motivated by selfishness on the part of knowledge communities. Lack of openness can be a major impediment to sharing knowledge. Communities along the Tyolomnqa Estuary do not seem to be entirely open to each other. There is a feeling that there is unequal benefit from the estuary and the activities of the Tyolomnqa Forum.

The research revealed that interaction between the various communities along the estuary is rather limited. As argued in Chapter Two some types of knowledge are explicit and relatively easy to transfer. Notwithstanding language barriers and the level of literacy, such knowledge is easily accessible for most members of the community irrespective of their openness. On the other hand, tacit and personal is very difficult to access (Aande, Von Krogh and Roos 1996:12). According to the three the "only possible way to reveal and transfer" tacit knowledge "is to establish a closer and more interactive relationship with the one possessing it" (Aande, Von Krogh and Roos 1996:12). The model that is going to be suggested in the next chapter will take into consideration this important issue.

4.2.5. Information and communication technologies for knowledge distributing and knowledge sharing in the Eastern Cape Estuaries.

Although knowledge management is not about technology, technology plays an important role in knowledge management. Technology facilitates the process of transmitting and exchanging information. According to Abell and Oxbrow (2001:51) ICTs are key enablers of the knowledge environment. ICTs should not be the driver or the barrier. It is increasingly recognized as effective implementation of ICTs that can help change behaviour for the knowledge sharing benefit, while poorly managed implementations can be detrimental to sharing knowledge (Abell and Oxbrow 2001: 51).

The findings showed that members of Buffalo City Council, Tylomnqa Conservancy and Chalumna Estates have a wide variety of information and communication technologies. This refers to access to telephones, computers, faxes and other information and communication technologies. The available ICTs enable the stated groups to distribute and the share the know-how amongst themselves and amongst the researchers. But the study provides that the stated groups have limits in sharing with the local villages. There are limited resources when sharing with the local villages. Whether the stated groups or researcher make use of the available telephone or sent pamphlets, run workshops when sharing knowledge with the local people.

According to responses from the interviews and focus groups local villagers have no access to personal telephone, faxes, computers or any electronic medium? They rely on one public telephones, which are in most case faulty, as well as household telephones and individual cell phones. They also rely on meetings, person-to-person communication and letters, especially when communicating amongst each other. They rely on individual telephones when sharing urgent knowledge to the other groups. Sharing and distributing knowledge amongst villages themselves is also problematic if those owning telephones or cell phones are not available. The limited access to ICTs in the villages creates a barrier and a delay in distribution and sharing of knowledge amongst the estuary users.

As much as the importance of ICTs have been stated. It had been identified that the use of ICTs is limited at the Eastern Cape Tyolomnqa estuary; only few individuals have accesses on ICTs. This is caused by the fact that the place is still very underdeveloped. It has been identified that local people use manual to distribute and share knowledge.

4.3. Results of the survey by questionnaire of the ECEMP researchers

A self-administered questionnaire was used as another means of data collection. Eleven (11) questionnaires were distributed, completed and returned. The questionnaires were targeted at the researchers involved in the ECEMP. The response rate to the questionnaire was affected by the fact that not all the 14 researchers that were targeted by the research attended the workshop where the questionnaire was distributed. In addition, the

researcher who failed to attend the meeting did not respond to the questionnaires sent through the post and e-mail system. The researchers that were targeted were member of the seven sub-projects involves in the ECEMP, which are namely governance, biodiversity, sustainable use, management systems, monitoring, rehabilitation, knowledge management. However, one or two members of all the seven sub-projects responded. No sub-project was excluded.

4.3.1. Demographic background and information of the respondents and their problems on managing estuaries

This section presents the characteristics of the respondents, which include gender, experience and location (e.g. villages). The respondents of the self-administered questionnaire were balance between the two genders unlike the case with interviews were males dominated. The respondents were literate. This was evident in their profession. Some were lectures, doctorate holders, professors, managers and post-graduate students. Respondents of this group came from different institutions; namely Coastal and Environmental Management, University of Natal (Pietermaritzburg), Institute of Natural Resources, Water Research Commission, as well as student from different universities, namely, Rhodes, UNP, University of Port Elizabeth, University of Transkei, University of Cape Town. They were therefore considered to be capable of providing relatively reliable information. They were specially chosen for the present research because of their involvement in the ECEMP.

4.3.2. Existing methods and techniques currently used for knowledge distribution and knowledge sharing in the Eastern Cape Estuaries

The existing methods used for knowledge sharing and distribution, are computers, fax machines, telephones, Internet, Intranet, pamphlets, workshops and other methods. The means of sharing and distribution knowledge amongst themselves and among other groups except for the villages are enough. The table below shows the number of currently used methods for knowledge sharing and distribution.

Table 3: Current methods used for knowledge sharing and distribution

Currently use methods	No of responses using methods	Percentage %
1. Informal contact with colleagues	8	72%
2. Face to face	7	63%
3. E-mail	7	63%
4. Written documents	7	63%
5. Internet	5	45%
6. Workshops and seminars	5	45%
7 brochures	2	18%
8. Technical manuals	2	18%
9. Intranet	1	9%

There were multiple responses to options given in the questionnaire. Judging by the number of responses presented in the table above there are a number of the currently used methods for knowledge sharing and knowledge distribution that the researchers use. Like in the case of the communities living along the Tyolomnqa Estuary, face-to-face communications seem to dominate their mode of knowledge sharing and distribution.

The respondents were also asked if they used the available methods to share and distribute knowledge. The table below indicates the number of response on the use of current methods for sharing and distribution of knowledge. As indicated in Table 4 ninety percent of the respondents used the methods of sharing catalogued in Table 3.

Table 4: Rate of use in current methods for knowledge sharing and distribution

Responses	No of responses	Percentage %
Number that use them	10	90%
Number that does not use all of them	1	10%

4.3.3. Human factors that affect knowledge sharing and distribution in an open environment

Knowledge sharing and distribution is affected by the proximity of researchers to one another. They are scattered all over the country because of their working environments. They only meet each other and representatives of the local villages during the workshops convened by the INR. Although they have means of communicating such as e-mails and other ICTs they do not seem to effectively utilize them. The result presented in the previous section demonstrated that they prefer face-to-face communication. It is important to state that the Knowledge Management sub-project set up a discussion listserv for the researcher, but the whole venture collapsed, as it had become a white elephant without any researchers using it for sharing and distributing knowledge. That fact further demonstrates that traditional means of communication are still preferred in the communities under study.

The respondents think sharing what they know can make those they share with to improve their individual sub-projects. It has also discovered that knowledge sharing between the local communities and the researchers was nonexistent. This is because of the fact that majority of local people lack technology that allows distance sharing. The only way in which the two groups can communicate and share knowledge is through the use of written documents, workshops, and meetings. However, the choice of language in which the documents should be written should be careful considered, as the majority of the communities along the Tyolomnqa Estuary are not conversant with the English. Using IsiXhosa should be considered as the most appropriate option.

The table below shows the barriers that affect knowledge sharing and distribution that were identified and the number of responses under each barrier.

Table 5: Barriers that affect human factor on knowledge sharing and distribution

Barriers	Strongly affect	Does affect	Doesn't affect	Not sure
Culture	3 = 27%	3 = 27%	3 = 27%	2 =18%
Apathy	3 = 27%	4 = 36%	2 =18%	2 =18%
Lack of technology	7 = 63%	3 = 27%	0 = 0	1= 9%
Selfishness	9 = 81%	2 = 18%	0 = 0	0 = 0
Location	5 = 45%	4 = 36%	2 = 18%	0 = 0

Judging by the number of responses on the table above, it shows that respondents believed that selfishness (nine-strongly affect) is the most human factor that affects knowledge sharing and distribution, followed by the lack of technology (seven- strongly affect), followed by location and other (five), followed by apathy (four-does affect), and then culture (three).

4.3.4 Effectiveness and appropriateness of current methods for knowledge sharing and distribution in the Eastern Cape Estuaries

What comes out very clearly in the researchers' responses to whether the current methods used for knowledge sharing are effective and appropriate is that the method are appropriate by they are grossly underutilized. This goes back to the facts laid in 4.3.3 that researchers are capable to share and distribute knowledge amongst themselves as researchers and among the other groups like the Buffalo City council, the Tyolomnqa Conservancy and the Chalumna Estate, but they are not able to share it with all the stakeholders involved in the management of estuaries, especially, the local villagers. This is because there have access to information communication technologies, which are mostly used as the current methods for knowledge sharing and distribution on one hand and the villagers have a poor ICT infrastructure on the other hand. Due to the reasons stated under 4.3.3 there is a limited use of methods. As stated above that people need to get incentives in order to share their know-how and skills.

4.3.5. Information and communication technologies for knowledge distributing and knowledge sharing in the Eastern Cape Estuaries

To deal with the above objective, respondent were asked about the information technologies they used for knowledge sharing and knowledge distribution. It was discovered that that unlike the communities along the Tyolomnqa Estuary they are exposed to a number ICTs. Table6 below should the level of use and exposure of researchers to ICTs. As demonstrated in the previous, it appears that the level of utilization of the ICTs by researchers is rather limited.

Table 6: Type of information and communication technologies used by researchers

Currently use methods	**No of responses using methods**	**Percentage %**
1. Computers	9	81
2. Telephones	9	81
3. Cell phones	9	81
4. E-mail	9	81
5. Internet	8	72
6. Intranet	7	63
7 fax- machines	6	54
8. Radio and TVs	2	18
9. Technical manuals	2	18

Judging by the results presented in the table above one can argue that researchers are capable of sharing knowledge among themselves using ICTs if they are possibly motivated to so. The only problem would be sharing and distributing their knowledge to the local villages where the ICTs infrastructure is completely inadequate.

4.4 Summary for chapter four

This chapter set out to present the analysis and interpretation of the data. The objective was to find out how knowledge was shared and distributed as well as the methods used in knowledge diffusion. One of the major findings was that sources of know-how and expertise are not easy to find and reuse, whether they are recorded in a physical form or held in someone's mind. Knowledge sharing and distribution is underdeveloped. The barriers to knowledge sharing were identified as language, lack of organisational structures to foster collaboration, knowledge sharing, continual learning and improvement as well as the lack of ICTs infrastructure. There are no incentives to encourage knowledge sharing.

Chapter five: Summary of findings, conclusions and recommendations

5.1. Introduction

The main purpose of the present study was to determine the optimal means of knowledge sharing and knowledge distributing in an open system using the Tyolomnqa Estuary in the Eastern Cape as a case study. Secondly the study was hoping to come up with a knowledge sharing and distribution model relevant for use in such system. It was also hoped that the model suggested would be applied or adapted for use in other similar systems.

5.2. Overview of the study

The introductory chapter began with a discussion of the definition of key terms. This is done to provide a clear understanding of the terms related to the problem on knowledge sharing and distribution in open systems. It also discussed the nature of estuaries in generally and focuses specifically to Tyolomnqa Estuary, which is one of the Eastern Cape estuaries as well as the Eastern Cape Estuary Management Programme. The aim, objectives and research questions were given. Finally the research justification, limitation and impotence of the study as well the structure of the thesis were discussed.

Chapter Two reviewed some relevant literature, which relates to knowledge sharing and knowledge distribution. The first section of the review focused on knowledge in general, knowledge sharing and distribution, knowledge management unto the reason why knowledge sharing and distribution is a problem as well as the involvement of ICTs into knowledge sharing and distribution.

The research methods used were described in Chapter Three. Three methods were used to gather information on knowledge sharing and distribution. The three methods are interviews, both face to face and focus groups, self-administered questionnaire and the review of related literature.

The presentation and interpretation of results of the survey, conducted by means of interviews and self administered questionnaire were tabulated in Chapter four under each objective measured. Chapter Five will be consist of the summery of findings, conclusion and recommendations of the study.

5.3. Revisiting the research questions of the study

To measure the purpose of the study the following research questions were formulated.

- What existing methods and techniques currently used for knowledge distribution and knowledge sharing in the Eastern Cape Estuaries?
- Which human factors affect knowledge sharing and distribution in an open environment?
- Are the current methods use for knowledge sharing and distribution in the Eastern Cape Estuaries effectiveness and appropriateness?
- What are the relevant ICTs to be used in knowledge distributing knowledge sharing in an open environment in the Eastern Cape Estuaries?

5.4. Summary of the findings

This section presents a summary of the findings with regard to the characteristics of the respondents and answers the above research questions.

5.4.1. Characteristics of respondents

The total number of face-to-face interviews done was sixteen which constituted the representative members of the Buffalo City Council, representative members of the Tyolomnqa Conservancy, representative members of Tylomnqa Forum and the representative members of the Chalumna Estate. The interviewees were people with knowledge and experience of the estuary management.

The focus group was made up of community representatives of the Tyolomnqa local villages, namely, Phozi, Ncera, Xhama, and Sandile villages, which makes total number of 48 respondents. These people live along the estuary, and use the estuary for their livelihood. Eleven respondents were researchers representing the sub-project of the

ECEMP, which constitutes sub-programmes such as biodiversity, governance, management systems, monitoring, rehabilitation, and knowledge management. These were people with knowledge and experience in research field.

Face-to-face interviews were the most appropriate method of data collection among the local communities because their level of literacy was low and many do not communicate in the English language. This was supported by the fact that most members needed materials interpreted from English to their vernacular language in order to understand the questions and answers as well as suggestions made during the running of group discussions. The self-administered question respondents showed a high literacy level. They completed questionnaires independently without needing much assistance and they also raised useful comments.

5.4.2 Main findings from the study population

In spite of the fact that local community respondents had ideas about managing estuaries and provided some suggestions of estuary development and successful maintenance as outlined in Tables 1 in Chapter Four, they had knowledge gaps some of which are catalogued in Table 2 in the previous chapter. The other key finding was that was methods and techniques used by both groups to share and distribute knowledge. The main means of sharing information and knowledge among local villagers were person to person communication; community meetings, general meetings, workshops, messages passed through school children during announcement at school assemblies and writing letters. There was no established formal structure to facilitate the sharing of knowledge. From the interviews it emerged that the Tyolomnqa Forum played a significant role in convening meetings to discuss estuary management issues, otherwise most of the knowledge is produced and shared on an individual basis.

On the other hand, researchers seem to mainly use face-to-face communications knowledge sharing and distribution like in the case of the communities living along the Tyolomnqa Estuary. The use of mass meetings is mainly effective for awareness of ideas and does not provide effective understanding in learning. Face to face and interaction

provides a good understanding of knowledge to be shared, however, it is slow and requires a lot of time of interaction.

It is clear from the findings that even though stakeholders attain and own knowledge there are limitations in distributing and sharing it. ICTs infrastructure along the Tyolomnqa Estuary is inadequate. On the other hand, the Bufallo City Council, researchers on the ECEMP and Tyolomnqa Conservancy extensively use ICTs.

5.5. Conclusions

Based on the results of the study, it is evident that while estuary communities have produced and shared knowledge it is often done in isolation and independently among individual users. It is evident that knowledge on the management of estuaries in the Eastern Cape is fragmented, difficult to locate and share and therefore it is not fully utilized. This is caused by the fact that there are limited means and resources for sharing and distributing knowledge, especially from the researchers to the local villages and the other way round. The stakeholders involved function like rivals and compromise the sustainable use of the estuary resources.

In order for knowledge sharing and distribution to be practiced the stakeholders involved should be motivated to contribute their knowledge as well as being encouraged to use it. The culture of knowledge sharing needs to be developed implemented and practiced. The use of ICTs should ideally enable this. However this has to be facilitated. It was stated that the availability of ICTs themselves without appropriate skills among users does not lead to effective usage. Furthermore the content of information (converted knowledge) to be transferred between the different users need to be appropriate. It is useless to simply pile ICTs in the rural community with the highly sophisticated technical information, which is written in English and expect that it will assist local people. However, if the ICTs were appropriate for example touch screens used and the content of information is based on what is collected from the people themselves, the locals can be taught how to use the ICTs, ask specific questions and “receive” appropriate answers from the systems. This type of technology is available, but requires financial and human resources.

It is important to have some kind of organizational structure in order to facilitate knowledge sharing in open systems. Open systems as stated in Chapter Two are informal organizations with individuals coming from different geographical areas with formal allegiances elsewhere involved as stakeholders with an intention to attain a common goal. There are often no rules or regulations binding the stakeholders. However, even within informal organization, if goals for the benefit of all are clearly identified, they tend to direct the nature of relationships and interactions. This is the typical way that rural communities have existed and shared indigenous knowledge as Thakadu (1998) in the case of Botswana has shown. After all the existing knowledge that is attained in the individual minds is important for use by all the stakeholders involved to achieve that common.

Estuary forums can be used as an alternative organizational structure to harness and share knowledge among estuary users and managers and other people involved. The appropriate model identified under recommendations aims at creating knowledge pools or knowledge networks as well as communities of practice with estuary forums forming the basis for sharing and collaboration. These knowledge pools can break down the geographical barriers and boost collaboration of stakeholders. The knowledge pools will lead to the efficient and affective creation, location, capturing sharing and distribution of knowledge among estuary users.

For the estuary forums to be effective in the process of knowledge management they should be representative of the communities that they are drawn from. The estuary forums should have regular meetings to allow members to consider the various issues faced in managing estuaries and share possible solutions and models adopted by other estuaries. The community forum would act as an information exchange and the sharing of the community group's resources of expertise. Through these forums, the "outside" technical experts like researchers could also participate and share their knowledge. By working together, there is the likelihood of developing the necessary trust to share the indigenous knowledge and experiment the utilization of other means of knowledge

sharing techniques and methodologies. It must be reemphasized that knowledge sharing requires use of various methodologies to fit different persons, with varied demographic characteristics, needs and abilities.

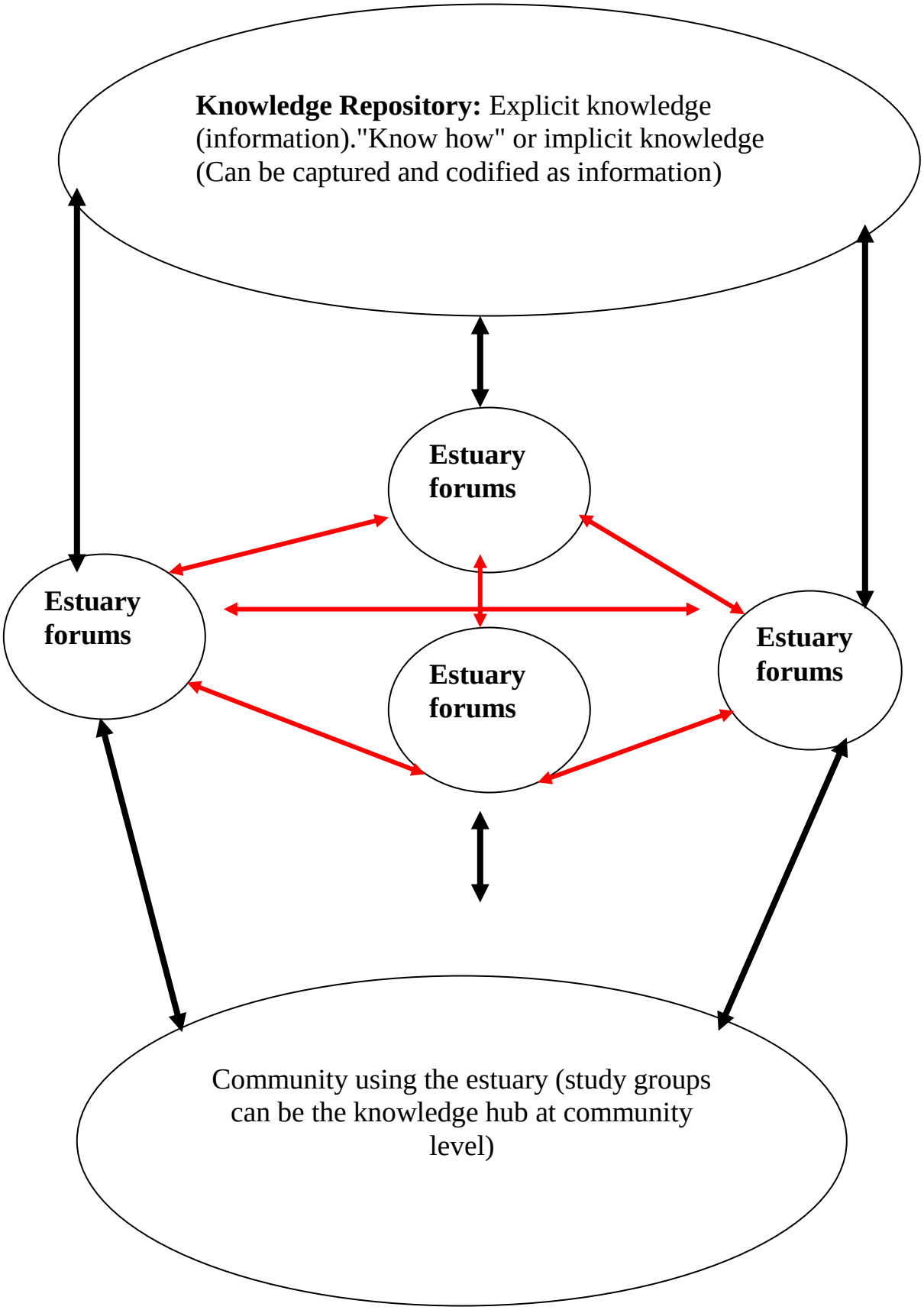
5.6. Recommendations

As advised by Turban, McLean & Wetherbe (2002:386), there is need to create a knowledge repository, that is, a lesson learned library that captures the best practices and lesson learned in the sustainable use of estuaries. The structure and content of the knowledge repository should also take into consideration the human factors like language barriers and the local content. The knowledge repository should be technological enabled so that it can harness the use of information and communication technologies to facilitate the distribution and sharing of knowledge. It must always be borne in mind that according to Samuel Johnson, one of the most important English writers of the eighteenth century, "[k]nowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it" (cited in Burke 2000:177). In that regard the envisaged knowledge repository would include both explicit knowledge imbedded in artifacts such as databases, books, posters and so on and tacit knowledge, through a database of estuary management knower's.

The envisaged model is not supposed to store knowledge, but it should be able to direct users to knowledge sources. The model will be based on a knowledge map, which represents the knowledge assets on the management of estuaries. For instance, yellow pages in a telephone directory direct users to the goods and services provided by subscribers rather than the actual resources. The visual model in the figure below further illustrates the envisaged use of knowledge in the management of estuaries in an open system.

In the long run, the management of knowledge resources would encourage estuary users to actively participate in the management of estuaries and make it easy for them to find and reuse sources of know-how and expertise, whether they are recorded in a physical form or held in someone's mind.

Figure 4: Proposed model for sharing knowledge in Eastern Cape Estuaries



Estuary forums should develop study groups in order to effectively empower people at the grass roots level. Study groups can be used as knowledge hubs that will create an environment that optimises knowledge. As coordinators of the knowledge repository, forums should bear in mind that:

The idea is not to create an encyclopaedia of everything that everyone knows, but to keep track of people who "know the recipe" and nurture the technology and culture that will get them talking (Arrian Howard, Huges Space and Communications cited in Abell and Oxbrow 2001:36).

Study groups would be used to further share information and knowledge on managing estuaries and the problematic of the concept of empowerment and doing things for themselves. Knowledge management tools are likely to foster collaboration, knowledge sharing, continual learning and improvement as well as improve the quality of decision making. The study groups can be used to share publications and other materials on the management of estuaries. Study groups will encourage interaction through meetings, and build mutual trust and continuous improvement of processes, recognise and reward knowledge contribution, use and reuse, entrench knowledge sharing into organisational life and practices, and motivate the community to establish its own governance structures and processes.

The study groups can also be used to develop a culture of generating and using knowledge in their various communities (Ngulube 2003). The success of the study groups will partly depend on:
Understanding of knowledge management and its benefits or what Zack (1999:54) refers to as the context of knowledge management which involves:

- Developing incentives to share knowledge;
- Funding of knowledge management initiatives; and
- the use of appropriate technology (for example, information and communication technologies).

Researchers on the Eastern Cape Estuaries Management Programme (ECEMP) can also be constituted as knowledge leaders in the area of estuary management. They can communicate knowledge on biodiversity, governance, management systems, monitoring, rehabilitation, and sustainable use of estuarine resources. They should actively contribute to the knowledge repository that is envisaged in the model proposed above. Thus, they can serve as knowledge specialists that would collaborate with estuary communities and contribute knowledge to the system. The researchers can also assist the estuary communities by presenting workshops, answering e-mail questions and, telephone and postal inquiries about knowledge of managing estuaries.

The use of information and communication technologies (ICTs) to foster interaction among the knowledge leaders should be actively pursued. Experience from elsewhere shows that while ICTs are important in facilitating interaction between the knowledge leaders, they cannot surpass the dynamics of face-to-face meetings (Storck & Hill 2000:73). According to Storck and Hill[38] (2000:73) face-to-face interaction helps knowledge leaders to have a deeper understanding of each other as well issues at stake. It is the keys to building mutual trust that is a major prerequisite to using digital technologies to share and diffuse knowledge. Digital interaction is not likely to succeed if openness and mutual trust is not promoted first. The researchers on the programme do not have a common organizational structure and perhaps, they do not have strongly expressed mutual interests. An environment should be created to promote interaction and learning from each other. Knowledge sharing should be integrated into the whole research process.

5.7 Recommendations for further research

Similar studies should be done on other estuaries in the Eastern Cape in particular and South Africa in general in order to find out if the results would replicate the findings of this study. Other studies on the appropriate technology to facilitate knowledge distribution and sharing in predominantly rural communities should be initiated. Another possibility for research would be looking at incentives that can be used to encourage

[38] Storck (2000)

people to distribute and share knowledge. Other areas of further research suggested by von Krogh and Roos[39] (1996:228) are relevant to the Eastern Cape Estuaries. Taking into cognisance that "knowledge is and will be the most source for building sustainable competitive advantage" von Krogh and Roos (1996:228) suggested some of the following areas:

- What partners are attractive for an organisation's knowledge development?
- How can knowledge be measured?
- The ability to identify suitable partners in knowledge development as well as measuring knowledge using defined indicators is likely to be key to addressing and reflecting on issues of knowledge management as they pertain to the sustainable use of estuaries.

[39] Krogh (1996)

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Appendices

Appendix 1: Interview guide for the Knowledge Management Project

Focus Group Interview Questions for Tyolomnqa Estuary Users

Introduction

Good morning ladies and gentlemen. My name is Lucky Mosia. We are based at the University of Natal in Pietermaritzburg. Our project is on Knowledge management. Thank you for coming. A focus group is a relaxed discussion.

Purpose

We are here today to talk about issues you are experiencing in the management and utilisation of the Tyolomnqa Estuary. The purpose of this discussion is to get your views on how you manage the estuary and how you share your know how in terms of managing the estuary. Thus, we want to understand how you share the knowledge you have, teach others and or educate them on working with estuaries, and the role you play in the management of the estuary resources. In addition, we want to find out the know-how and skills that you don't readily have but that you require for protecting and conserving the estuary, and what knowledge sources you use to manage the estuary. We are not here to give you answers but rather hear from you. Your views are what matters. There is no right or wrong or desirable or undesirable answers. You can disagree with each other, and you can change your mind. We would like you to feel comfortable saying what you really think and how you really feel.

We hope that the information you will give us and the discussion today, will help all of us including yourselves put in place better means and way of using and managing the resources of the Tyolomnqa Estuaries. We also hope that your experiences and knowledge that you have may be shared with others in other estuaries so that we can manage the resources better.

We will be taking notes and tape recording the discussion so that we do not miss anything you have to say. Everything you say is confidential. Although we will ask you to tell us your names so that we can address one another by name, when we write up the report, we will not include your names and no one will know who said what and we would not write your names down. We want this to be a group discussion, so feel free to respond to me and to other members in the group without waiting to be called on. However, we would appreciate it if only one person talks at any given time and if you can give an opportunity to one speaker to complete what he/she wants to say. The discussion will last approximately 1 to 2 hours. There is a lot we want to discuss, so at times we may go beyond the time limit a bit.

Group interview questions or discussion

SESSION1: Participant Introduction (30 minutes)

Now let us start by everyone sharing their name, where they come from, what they do (for a living), and how long they have been involved in estuaries.

SESSION 2: 1 Hour

Procedure: May each one of you write your responses on a card provided and after we will have an open discussion. (Procedure applicable to the Tyolomnqa Forum)
(Since this will be more of a discussion, the lists that we have as possible choices can be used to prompt them to discuss the listed issues, if they are hesitant. Therefore, the given options will not be read to the respondents in the first instance, but will be used if and when they appear not to have an idea).

How or where did you learn about estuaries? Did you learn through?

- Meetings (Workshops, seminars)
- On my own
- Colleagues

How many of you use the estuary?

For those who indicate that they don't use the Estuary ask them why. They may well change their minds when they hear from other colleagues and obviously the variety of uses, which may not have been obvious to them.

What do you use an estuary for? Do you use it for: (Don't give them the list to begin with).

- Fishing
- Harvesting of craftwork and house-building material
- Collect traditional herbs
- For grazing cattle
- Recreation like swimming
- Washing etc

Is there anything that you do or rules that govern the use of the Estuary? For example are there times of the year when people are not allowed to fish? What kinds of activities are these? (After getting some indication on the rules or activities then you ask the specifics of Protection and Conservation. But you should start by using general words that describe protection and conservation) Are you currently involved in the protection and the conservation of the estuary and its resources?

- No
- Yes. If yes, what is your role?

SESSION 3: 1 Hour

Procedure: I would like each one of you to write down responses on a card provided and after we will have an open discussion (*Tyolomnqa Forum only*).

Do you have any concerns and or problems about Estuaries?

Can you explain what these are

Have you done or do you do anything about these problems? Why?

What are your main concerns or problems regarding the Estuary? Do you have problems with:

- Sediment degradation

- Access (denied access for fishing, restricted, unlimited, vehicle access, no proper control, local people and cattle no access to paths or roads)
- Lack of fishing tools (e.g. boats, rods and reels)
- Lack of knowledge (skills or know-how) in protecting and managing the estuary
- Over-exploitation of the estuary resources
- Lack of quality water
- Lack of policing
- No tourism initiatives

What approach or strategies have you taken to address the above issues or concerns? Where did you go to in addressing the above issues? Did you:

- Use your own skills and expertise
- Seek advice from estuary managers, government officials
- Talk to community members
- Discuss the issue in the Tyolomnqa Estuary Forum
- Read about it
- Did nothing about it

Why have you taken this approach or strategy? You have taken this approach:

- I am more knowledgeable in the area
- Estuary managers have expert knowledge about the issue
- It is the best approach in addressing the issue
- How did you acquire or learn these skills and knowledge?
- Workshops and seminars
- Informal training
- Formal training
- Interaction with people knowledgeable in the field
- Reading manuals and guidelines

SESSION 4: 1 Hour

What do you think should be done to address or solve these issues? Give reasons.

Education and awareness

Start or initiate volunteer monitoring programmes

Elect field rangers to monitor the estuary

Formalise and manage access

What skills or knowledge do you need to address these issues? Do you need skills or knowledge on:

- Sedimentation
- Law enforcement
- Traditional fishing
- Environmental compliance
- Estuary resources management
- Estuarine conservation and protection
- Tourism

Give reasons why you need these skills? Probes: What would be the best avenue(s) for receiving these skills?

How many of you have shared their skills and knowledge about estuaries (also relate to the uses they have given above) with others? Probes: Tell us about what you shared. Tell us about why you choose to share your skills and knowledge? How did this happen (through workshop and seminar presentations, informal conversations, estuary forum meetings, etc.)

Where do you get the knowledge on managing estuaries (its location)?

How do you share the knowledge?

Closure and summary

Though there were many different opinions about (i.e. issues) _____, it appears unanimous that_____ Does anyone want to add or clarify the point?

Is there any other information regarding estuaries that you think would be useful for us to know?

Thank you very much for coming to this workshop. Your time is very much appreciated and your comments have been very helpful.

Appendix 2: Letter from the researcher

Dear Respondent

I am Masters Student in the Information Studies Programme at the University of Natal, Pietermaritzburg. I am doing a research on Knowledge Management. The focus of my research is on "Knowledge sharing and knowledge distribution in open systems with special reference to Eastern Cape estuaries".

The purpose of this research is to determine the means of sharing and distributing knowledge in an open system for the management and use of the Eastern Cape Estuaries especially the Tyolomnqa Estuary. It is hoped that the lesson learnt from this study and the subsequent recommendations will be used to improve the sharing and distribution of knowledge in the Tyolomnqa Estuary and other similar estuaries for better management and utilization.

This questionnaire is intended to collect data from you as a researcher in the Eastern Cape Management Programme. Your participation in the present study will contribute to a better understanding of knowledge sharing and distribution practices to enhance learning and perfomance by researchers, estuary users and estuary managers in the Eastern Cape Management Programme.

I would appreciate it if you could spare few minutes of your time and complete this questionnaire. Return the questionnaire either to the distributor or to the following address: Ms L. N. Mosia, University of Natal, School of Human and Social Studies, Information Studies Programme (KM Project), Private Bag X01, Scottsville 3209
Should you have any questions about the questionnaire please contact the researcher on the above address or on the following contact phone or e-mail: cell no. 0721814284 and e-mail: mtwanas@yahoo.com

Thank you in advance.

Appendix 3: Questionnaire on Knowledge sharing and knowledge distribution in an open system: a case study of the Eastern Cape Estuaries Management Programme

Definitions

Knowledge is information that has been understood, interpreted and validated in the context of application. As such knowledge represents a recognized platform for action. It has to be purposeful and useful.

Knowledge sharing is like communication. Communication tends to emphasize simple making it easy to send information from person to person. People doing it need to organize the communication links in ways that fit in with their work practice. Communication system thus provides access to known sources of knowledge. Knowledge sharing goes beyond communication, it provides additional support by ensuring that people have just–in-time access to the latest information and that communication systems are specialized in ways the make it easy to use this information.

Instructions to complete this questionnaire

To fill this questionnaire you will be required to choose your answer from the given options. You have been asked to tick the options that apply to you and to elaborate where necessary.

1. Which project are you involved in? (Please tick. You may tick more than one)

- ❑ Biodiversity
- ❑ Governance
- ❑ Sustainable Use
- ❑ Monitoring
- ❑ Management systems
- ❑ Rehabilitation
- ❑ Knowledge Management

2. What institution or organization do you work for?……

3. How many years have you been involved in estuarine management? (Please tick)

- ❑ 0-2 years
- ❑ 2-5 years
- ❑ 5-10 years
- ❑ 10-15 years
- ❑ More than 15 years

4. What is your participation in relation to estuary management programme?

I am a:

- ❑ Project manager
- ❑ Project assistant
- ❑ Member of the project team (collaborating researcher)
- ❑ Project student research assistant

Other, (specify)……

5. Are there any instances in the course of doing your work related to estuaries where you feel you lack particular know-how or skills on the management and utilization of estuaries? (Please tick)

- ❑ Yes
- ❑ No

6. What kind(s) of know-how and skills do you find in need or acquire for use in estuary management and use? (Please briefly list or describe in the space below)

……

……

……

7. How often do you have access, find or acquire the kind of know-how and skills you have described in 6 above? (Please tick)

- ❑ Never
- ❑ Rarely

- ❑ Sometimes
- ❑ Always

8. Where do you get the required know-how and skills? (Place a tick in the circle provided next to the appropriate answer. You may tick more that one.)

Through:

- ❑ Technical manuals
- ❑ Intranet
- ❑ Informal contacts with colleagues
- ❑ Course and seminars- internal
- ❑ Courses and seminars-external
- ❑ Internet
- ❑ E-mail
- ❑ Brochures
- ❑ Attending ECEMP's workshops.

Other? (Please specify)…… ……

9. How do you acquire new or update your skills and know-how related to estuaries? (Please tick)

Through:

- ❑ Attending conferences
- ❑ Online group discussions
- ❑ Attending workshops
- ❑ Informal talks with colleagues
- ❑ Reading about it
- ❑ Listening to the radio
- ❑ Viewing it on TV

Other (Please specify) ……

10. Does your institution or organization you work for (as described in 2 above) encourage knowledge sharing?

- Yes
- No

If yes how is this encouraged? (Please specify) ……...

If not why not? (Please specify)…….

11. What methods do you currently use for communicating and sharing in your know-how arising out of the project work in your institution? (Place a tick in an appropriate circle. You may tick more than one)

- Technical manuals
- Intranet
- Informal contacts with colleagues
- Course and seminars- internal
- Courses and seminars-external
- Internet
- E-mail
- Brochures

Other? (Please specify) ……

12. Have you used any available channels to share knowledge for the successful management of Eastern Cape estuaries? (Please tick the appropriate one).

- Yes
- No

13. If yes, which of the following channels have you use to distribute available knowledge? (Place a tick in an appropriate circle; you may tick more than one)

- Internet/ list serve
- E-mail
- Face to face conversation
- Radios

- Newspapers
- Brochures
- Written documents
- TVs

Other? (Please specify)…….

14. In the table below please respond in respect to your view the accessibility of skills and know-how about estuaries.

Attribute	Strongly	Agree	Strongly	Disagree
a) Key knowledge on estuary use or and estuary management is not available.				
b) I can always easily find knowledge I need				
c) All the stakeholders have access to knowledge needed via desktops				
d) Relevant external knowledge about estuary use and /or estuary management is available to all stakeholders				

15. To what extent do you agree or disagree with the following that relate to ECEMP Project managers? (Choose your answer from the given options)

	strongly agree	agree	Disagree strongly	disagree	neutral
encourages me to come up with solutions to work related problems					
organizes regular meetings to share knowledge with me					
encourages open communication in working groups, even if it means disagreements					
encourages not only by words but also					

actions the importance of sharing knowledge					
Keeps every participant informed					

16. In the series of statement below, please indicate your views or options (Place the relevant tick under corresponding answer)

a. strongly agree b. agree c. disagreed, d. strongly disagree e. neutral

	strongly agree	**agree**	**disagree**	**strongly disagree**	**neutral**
The culture of your programme provides opportunities for communication of ideas, knowledge and experience among all members involved in estuary management programme					
Individuals in the project view knowledge as a programme resource to be shared by programme members, rather than as a source of power to be used for personal advantage					
Members are encouraged to bring new knowledge into project.					
Members often share experiences informally in the project at large					
There are people who prefer to work on their own in my project.					
Team members are kept up to date with new knowledge.					

17. Do you feel that your project and the ECEMP generally has in place incentives and mechanisms for knowledge sharing?

- ❑ Yes
- ❑ No

If yes what are they?

……

18. Do you feel that these incentive or mechanisms helps to improve the knowledge sharing culture?

- ❑ Yes

Please explain in what way(s) …….

- ❑ No

Please explain why not…….

19. The table below shows a number of possible barriers to distribution of "know how" and skills about estuary management. Please indicate your opinion the degree of importance of each barrier or how severe each barrier affects knowledge distribution of estuary use and / or estuary management. (Place the relevant tick under corresponding answer)

Barriers	Strongly affect	Does affect	Not sure	Doesn't affect
Cultural				
Location of people				
Lack of technology				
other (specify)				

20. Do you make use of information communication technologies (ICTs) as the means of distributing and sharing knowledge in you programme. (Please tick one)

- ❑ Yes
- ❑ No

If yes, which ICTs do you make use of? (You make choose more that one provided below)

- ❑ Internet/ intranet/ extranet
- ❑ E-mail
- ❑ Document management system
- ❑ Search /index/retrieval
- ❑ Data warehousing/ data mining
- ❑ GroupWare

Other (specify) ……..

21. Do you consider the available ICT methods that you use for knowledge distribution and knowledge sharing to be effective? For example, do you easily find answers to questions about estuary management through the use of ICTs like e-mail; Listservs; discussion group? (Please tick)

- ❑ Yes
- ❑ No.

If yes why? (Please specify)

……

……

If no, why not? (Please specify)

……

……

22. Do you consider the available ICT methods that you use for knowledge distribution and knowledge sharing to be appropriate? (Please tick)

- ❑ Yes
- ❑ No

If yes how? (Please specify)

……

……

If no, why not? (Please specify)

……

……

Your response is highly appreciated.

Thank you once more for your co-operation